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MASSACHUSETTS AGRICULTURE.

New York State [illegible]
at Cornell University
Department of Poultry Husbandry
Ithaca, N. Y.

BULLETIN No. 1. NOVEMBER, 1908.

POULTRY CULTURE.

Issued by the
State Board of Agriculture, State House, Boston, Mass.
J. Lewis Ellsworth, Secretary.

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PROGRESSIVE AND PROFITABLE POULTRY CULTURE.[1]

BY ARTHUR A. BRIGHAM, PH.D., MARLBOROUGH.

For those who have the interest, the patience and the perseverance necessary to the profitable consideration of statistics, the following special points relating to poultry are given: —

STATISTICS TO STUDY.

A few figures from the latest census report of the United States relative to poultry will give a definite idea of the magnitude of the poultry interests of this country.

The reported number of "chickens" (common domestic fowl) three months old and over, including Guinea fowls, on the farms and ranges of the United States, June 1, 1900, was 233,598,085; the reported number of turkeys was 6,599,367; the reported number of geese was 5,676,863; the reported number of ducks was 4,807,673; total poultry, 250,681,988.

The number of farms in the United States was 5,739,657; the number of farms which kept fowls was 5,096,252. Of all the farms in the United States, 88.8 per cent kept poultry. "Chickens" as a favorite crop certainly rank next to the crop of boys and girls on American farms.

On June 1, 1900, the total value of poultry in the United States was $85,794,996; for the year 1899 the total value of the poultry raised was $136,891,877, or $16.83 per farm. For 1899 the total value of eggs produced was $144,286,158; the total annual poultry products of farms and ranges was $281,178,035. The census report estimates the annual products from poultry not on farms and ranges as follows: poultry raised, $7,000,000; eggs produced, $7,000,000;

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[1] Agriculture of Massachusetts, 1903.

total annual poultry products of the nation, $295,178,035. The grand total value of the annual poultry products reported and estimated is almost $300,000,000.

The census of 1900 does not include the poultry under three months old on June 1, 1900, while the census of 1890 did include the young chickens, so that it is difficult to compare the figures for ascertaining the increase in numbers and value in the ten years from 1890 to 1900.

We can obtain a more definite idea of the advance made by comparing the egg production reported. For the census of 1890 the total annual production of eggs in dozens was 819,722,916; for the census of 1900 the dozens reported were 1,293,819,186; this shows 57.8 per cent of increase in egg production between 1890 and 1900.

The average annual production of eggs per fowl, according to the census of 1900, was 5.6 dozens; the average value per dozen eggs was 11.2 cents. The number of eggs per capita of population shown by the census of 1900 was 17 dozens, while in 1890 the average per capita production was 13 dozens.

In the United States the values of several farm products in 1899 were as follows: dairy products, $281,629,958; sheep products, $170,337,002; swine products, $232,027,707; poultry products, $295,178,035.

In Massachusetts there were in 1900, according to the United States census, 37,715 farms; dairying was the industry on 14,900 farms; sheep were kept on 1,447 farms; poultry was kept on 30,504 farms. The "business hen" is found on over 80 per cent of the farms of Massachusetts.

The value of the total farm products of Massachusetts in 1899 was $42,298,274; poultry raised was valued at $1,407,681; eggs produced were valued at $2,571,341. Poultry and eggs made over one-eleventh of the total value of the farm products.

In a recent contribution to the press, that veteran editor, Mr. A. F. Hunter, gave, as the result of his study of the reports of the Boston Chamber of Commerce and other sources of information, the following: —

Eggs received in Boston.

YEAR.	No. of Cases (30 Dozen).	Highest Price (Cents).	Lowest Price (Cents).
1890,	625,581	28	14½
1891,	635,138	29	15
1892,	711,311	30	13¾
1893,	710,213	36	15
1894,	777,353	25	11
1895,	780,196	29	13
1896,	873,925	24	10
1897,	912,754	23	10
1898,	889,216	25	10
1899,	900,219	29	13
1900,	986,367	28	12
1901,	1,040,555	26	12
1902,	1,053,165	36	15½

The grade of eggs taken for the standard of price is "fresh western," and we give the highest and lowest price of each year. A study of the tables gives some interesting figures. The lowest average price for the whole year is 15½ cents, in 1897; and the highest average price is 22½ cents, reached in 1890 and again in 1902. There was one week in January, and again the second week in February, 1893, when fresh western eggs reached the unusual price of 36 cents a dozen, and yet the average for that entire year was but 20¾ cents. In 1902 the highest price reached was 36 cents, the lowest 15½ cents, and the average for the fifty-two weeks was 22½ cents. Marketmen tell us that not only is the quantity of eggs received in Boston increasing rapidly, but that the price is steadily advancing also; the figures given in the Chamber of Commerce reports, however, hardly bear out the latter statement. Eggs have been unusually high in Boston all of this year, which promises to be a record breaker; but the highest price of last year was no higher than that of 1893, the lowest price of last year only a half cent above the lowest figure of both 1891 and 1893, and the high average price of last year was exactly equal to the average price in 1890; these figures indicate a fairly steady price, taking several years together.

17,334 Tons of Poultry.

The steady increase in the consumption of eggs is outdone by the greater increase in the consumption of poultry; in each of the three years last past there was received in Boston markets more than three times as much dressed poultry as in 1890 or 1891; the receipts more than trebled in ten years. Poultry packages are not uniform in size, but the statistics clerk of the Chamber of Commerce gives the average of the packages as 150 pounds.

Year.	No. of Packages.
1890,	102,113
1891,	95,900
1892,	132,409
1893,	143,200
1894,	164,480
1895,	198,237
1896,	192,236
1897,	211,695
1898,	207,308
1899,	223,481
1900,	314,943
1901,	319,129
1902,	316,319

Of the 316,319 packages of poultry received in Boston last year, 85,200 packages were for export (through shipments to Europe), leaving 231,119 packages for consumption, a total of 34,667,850 pounds, — almost 17,334 tons. The average value of this dressed poultry last year is given as 13 cents a pound, the total value being $4,506,817.50; the grand total for eggs and poultry received in Boston being $11,614,781.25.

Probably $18,000,000 in the Whole State.

There are quite a number of cities in Massachusetts, and inquiry reveals that they too receive considerable quantities of eggs and poultry in direct shipments from outside the State. There are no Chamber of Commerce statistics for these cities, but estimates furnished us by wholesale produce dealers or the managers of cold storage warehouses give us the following figures of receipts of eggs last year: —

City.	No. of Cases.
Worcester,	About 150,000
Springfield,	About 100,000
Holyoke,	About 50,000
Fitchburg,	About 20,000
Lowell,	About 145,000
Lawrence,	About 30,000
Haverhill,	About 20,000
Lynn,	About 50,000
Salem,	About 40,000
Taunton,	About 50,000
Brockton,	About 40,000
New Bedford,	About 40,000
Fall River,	About 70,000
Total,	805,000
Value,	$5,433,750

This total value is a little more than five-sevenths of that of eggs received in Boston; and, as we are assured the proportions of dressed poultry are substantially the same as of eggs, we take five-sevenths of the value of dressed poultry received in Boston as the value of dressed poultry received in those cities, and have $3,219,155, the grand total of eggs and dressed poultry received in Boston and the thirteen other cities named being $20,263,686.

It is certain that a part of the eggs and dressed poultry appearing in the receipts of other cities appears also in the receipts in Boston, being bought in the latter city by dealers in near-by cities, such as Lynn, Salem, Haverhill, Lawrence, Lowell, etc.; but dealers assure us that those figures would be quite balanced by the poultry and eggs brought into cities near the borders of the State by producers living over the line. Then, too, the cities and large towns in the western part of the State receive their supplies from New York City and Albany; and we have left out of the reckoning several cities, such as Newburyport, Gloucester, Marlborough and Northampton. To be perfectly fair in the figures, however, let us deduct $2,263,686 from the total, considering that the figures are duplicated to that amount, and we then have $18,000,000 as the money value of poultry and eggs coming into the State last year.

ADVANTAGES AND IMPORTANCE OF THE POULTRY INDUSTRY.

Some of the reasons for the evident increase of poultry keeping as an occupation are the following: —

1. Only a small amount of capital is necessary, if the

poultry keeper is satisfied to begin with a few fowls and to develop the business gradually.

2. The investment of funds, if properly made, yields prompt and reasonable returns.

3. For starting in the business a small area of land is sufficient, and a location may be selected where the land is not high in price.

4. Dressed fowls and eggs are favorite foods of the people, and as such are in constant demand, at fair prices.

5. The demand for poultry products is increasing, because of the advancing prices of meats of all kinds and the gradual diminishing of the supplies of wild fowls and other game. Furthermore, new and special uses for poultry products, especially eggs, are arising and extending.

6. The products of poultry keeping are concentrated and valuable, though perishable. They can stand considerable expense for prompt transportation in fresh condition to desirable customers. They are salable for cash. There is little if any waste.

7. The fowls utilize much of the wastes of the household and farm, and turn them quickly into products of value.

8. Poultry properly managed enrich and benefit the farm, garden and orchard.

9. Poultry keeping may be advantageously combined with or added to other occupations.

10. The industry is a healthy one, and yields to intelligent, interested, earnest labor a suitable return of profit and pleasure.

In addition to the statistics already given, emphatic indication of the importance of poultry is found in the quantities of dressed fowls and eggs for sale in the stores, stalls and markets of the cities, towns and villages of the State and nation.

Further evidence is given by the large and increasing business done by express companies, railroads, steamboats and other carriers in the transportation of poultry products. Modern methods of rapid transportation have revolutionized poultry keeping as an industry. The supply is no longer limited to the local demand; it has vastly increased, and the surplus is sent to more or less distant consuming centres, to the evident advantage of producer, carrier and consumer. There is no further danger of a glut in the market; cold storage and exportation take care of any temporary excess of production. Poultry farming, although a young industry as yet, employs a host of collectors, carriers, and distributers in preparing and delivering its products to consumers. It should also be remembered that probably one-half of the total production is consumed in the households of the producers.

An emphatic indication of the importance of the poultry business is shown in the extensive advertisements of industries which are dependent upon poultry keepers for trade. Examples of these allied industries are the manufactories of incubators, brooders, bone-cutters, cramming machines, poultry fences, roofing and sheathing papers, special poultry feeds, portable poultry houses and poultry appliances.

Among the most striking evidences of the popularity of the keeping of pure-bred poultry are the numerous, worthy and well-patronized poultry papers, and the many attractive and well-attended poultry exhibitions, of which Massachusetts furnishes fine samples.

Foundation Factors.

In preparing for the practice of profitable, progressive poultry culture, the beginner must study the principles involved in their application to the solution of his particular problem. The foundation factors of the poultry business are those of any and every other business, — land, labor, capital, brains. The proper use of these factors by the poultryman who is personally adapted to his business will result in progress and profit. Common sense, wise expenditure and economy, preventing leaks and disease, stopping wastes before they begin, persistent and energetic effort according to a well-defined system, will bring success and profit in poultry. Several practical points command attention.

Location.

Soil. — The ideal land for a poultry farm is sandy loam, which is naturally well drained and yet capable of producing good crops of grass, clover, cabbages and mangolds for green food, and of corn, wheat and oats for grain food, and Canada peas, soja beans and sunflowers as partial substitutes for animal food; and containing gravel, which the fowl may use as grit or grindstones for its gizzard grist-mill.

Slope. — The most favorable aspect is one which inclines gradually to the south, with south-east a second and south-west a third choice. Thereby is secured the full benefit of the sunshine in winter, and ready surface drainage in spring and fall.

Shelter. — The protection of rising ground, preferably covered with forest growth to the north and north-west, is desirable to break the strength of the strong prevailing winds, and aid in producing an approximation to the condition of balmy June in the substantial shelters during the season of severe cold, windy and rainy weather.

Carefully constructed, comfortable houses are most important aids in ameliorating the somewhat unfavorable natural influences of a rugged and changeable climate.

Shade. — Summer as well as winter must be planned for. Sultry, stagnant, superheated surroundings in July and August are unquestionably more debilitating and destructive to hen health than the rigors and sudden changes of our New England winter. There is nothing more comforting and gratifying to hen or human than the cooling shade of leafy trees in the heat of mid-day in summer time. Sufficient trees, then, in the yards or on the range are necessary to the health and happiness of the feathered flocks of the farm.

STRUCTURES.

Situation. — The poultry house ought to be placed on a well-drained spot, facing the south or south-east. Its floor, whether of earth, boards or concrete, should be at least six inches above the level of the surrounding ground, and shaped so that any unwelcome water which might get upon it shall immediately flow off and away from the house.

Ventilation. — The hen houses in summer time, instead of being close, stifling boxes, with fronts all of glass, should be made into shady shelters by replacing windows and doors with frames of wire netting, and by otherwise opening up the quarters so that they shall be little more than open sheds or shelters, whose tight roofs will protect the fowls alternately from the scorching rays of the hot sun at noonday and the down-pouring flood of sudden showers, while affording always the free fresh air that would naturally be found by the fowls roosting in trees. At the same time by the aid of wire netting the birds are protected from night prowlers of the four-legged and other varieties.

It is both progressive and profitable in poultry architecture to secure the advantages of the scratching shed or covered exercising place, and to include this space as a part of the comfortable living room during the inclement weather. This is readily and economically accomplished by combining the scratching shed with the laying and roosting room, by providing a roosting platform with curtained front, by wide double front doors for each house or room for a flock of thirty fowls.

How to ventilate the hen house in winter is a much-mooted question. It is easily and economically accomplished in either of two ways: —

A window of two sashes may have the lower sash raised two or three inches and a board inserted under the sash frame, filling the space so that the wind shall not enter directly, but pass between the frames at the middle of the window, and enter the room without creating a direct draft upon the roosting birds. Another plan, where the hen house has a double pitch roof, is to place poles or joists four or five inches apart to form a perforated ceiling at the level of the tops of the plates, say six or seven feet above the floor, and upon this scaffold pile loose straw, hay or evergreen boughs, one or two feet deep. In the gable ends above the "straw loft" place windows or ventilator holes, and by opening the same more or less regulate the entrance and exit of the air, which, sifted by the straw, is supplied fresh, dry and without direct drafts to the fowls in the room below. This plan prevents excessive moisture in the room atmosphere, and corrects any tendency to dampness and chilliness which are the frequent causes of the dreaded scourge termed roup. On the hot, bright days of summer the "straw loft" acts as a shield against the direct downbeating of the sun's rays, and helps to keep the room below equably and comfortably cool, thus lessening the debilitating influences which so frequently weaken the fowl, and prepare for its succumbing to the strain of the molting period.

BREEDING.

The idea, so prevalent, that the farmer should each year purchase one or more male birds, and thus introduce "fresh blood" into his flock, is the bane of progressive breeding of poultry. It is going back in stock breeding one hundred and fifty years, to the time when English and American farmers made it a rule to always cross-breed. Robert Bakewell, the father of modern stock breeding, established the principle of breeding together animals of like excellent qualities, regardless of blood relationship. This plan, put in practice by the Colling Bros., produced the splendid Shorthorn breed of cattle. To-day skilful poultry breeders, by careful "line breeding," are producing like results among fowls instead of constantly seeking to introduce new and strange blood, thereby breaking up the tendency to superior egg production, to flesh making and fine feathering, resulting in irregular egg yield, showing scarcity during periods of high prices and abundance when eggs are cheapest, uneven flesh production, and plumage of all kinds and colors. The average farm flock is an heterogeneous mixture of all varieties, sizes, shapes and colors of fowls. They may sometimes have the much-coveted vigor, but possess little else of value or profit to the owner. The exception is the fine flock of one breed, uniform in size, development and color, an important source of profit and pleasure to the farmer and his family, and an effective advertisement of profitable progressiveness. The guiding principle is to breed together the best birds along well-defined lines, without fear of affinity in blood, so long as the stock is strong of constitution and in perfect health.

Every poultry farmer should breed with a definite purpose in view, and develop his own strain of pure-bred poultry for profit. Where time and patience permit, "trap nests" are effective aids in selecting the most productive pullets, which may the next year, as mature fowls, be used in the breeding pens to produce more and better of their kind. Prepotency pays in poultry breeding. It signifies extra strong power in transmitting quality to offspring; and by mating together fowls having the power along the lines of egg production, early and large flesh development, or beautiful shape and attractive plumage, offspring are secured which have enhanced value along these lines, and intensified power in reproducing the same in their progeny.

INCUBATION.

The subject of artificial hatching is too large to allow of treatment here, but one or two hints may at least be given. Late experiments and experience with hatching machines emphasize the desirability of restricted ventilation, or the supplying of abundant moisture in the air of the egg chamber during the first week of incubation. Either or both of these precautions tend to aid normal rational development of the embryos during the early stages. On the other hand, abundant ventilation, and, if necessary, daily airing of the incubating eggs during the latter half of the incubating period, tends to healthy, regular growth of the chicks in the shells and to safe hatching of vigorous broods of birds.

The very opposite of these conditions too often prevails, and the results include hemorrhages, shown by " blood rings " in the eggs; enlargement of the heart and blood vessels, indicated by large and very bright scarlet veins; a sharply defined body and very dark " eye spot," as seen in the light of the egg-tester. The " blood ring " is the sign of death. The sharp, distinct outline of the embryo and the bright scarlet blood vessels indicate excessive development of the circulatory system, from which later there is a reaction, indicated by sluggish development towards the end of incubation, death in the shell, or failure to hatch even after the shell is pipped. If the chicks do hatch, they are very likely to be weak, to mope about, to " hug the heat " and huddle under the hover of the brooder, to have little appetite, and in spite of the poultryman's care to give up the struggle within ten or twelve days after hatching. When too high a temperature or "hot spots" in the incubator chamber add their influence to excessive ventilation during the early stages of incubation, the results are yet more rapid and deadly. The incubation problem is one which each poultryman has to solve himself, according to his local conditions. That this question is not yet solved by many, is evident from the very poor hatches and the heavy percentage of death in the brooders so commonly experienced.

FEEDING.

Chemical analyses and digestion experiments in connection with poultry feeds will aid in reckoning trial rations, and the hens will show by testing how the rations may be improved.

The diet of the fowls must for best results include grains, green food, animal food and mineral food. Costly protein or "flesh-forming" nutrients should not be fed in excess, when cheap starchy constituents will answer for keeping up the heat of the bird's body.

A series of brooder feeding experiments in case of incubator chicks, conducted at the Rhode Island Experiment Station, gave the following results: —

A flock of 46 chicks, fed on egg, liver and green food, reached a death rate of 63.7 per cent, of which 85.8 per cent showed bowel troubles.

A flock of 58 chicks, fed on grain exclusively, showed a death rate of 32.7 per cent, of which 76.5 per cent had digestive troubles.

A flock of 63 chicks, fed on grain and green food, all animal food being withheld, showed a death rate of 9.5 per cent, of which 75 per cent had digestive disorders.

A flock of 52 chicks, fed a complete and balanced ration, including "infertile" eggs, liver, cracked corn, wheat and barley and green food in the form of oat sprouts and chopped onions, had a death rate of 3.9 per cent, and not one chick showed digestive disorder.

Exhaustive experiments, carried on by the New York State Experiment Station, corroborate these results, and also emphasize the necessity of sufficient mineral food for growing chicks and ducklings.

All of these experiments indicated that the increased amount of protein used to balance the grain ration not only reduced the death rate but also promoted rapid growth.

The same principle applies in feeding for egg production, for fattening and finishing for market, for the molting period, and for exhibition condition of fancy fowls. The ration should, for best results, be balanced for its purpose, all the conditions being considered, and use made of the available feeding stuffs which are best adapted, most economical and effective.

Whether mashes shall be fed, or exclusive dry feeding followed; what feed-stuffs to use, and the special method of feeding, — all these and other related details must be worked out by the poultryman according to the conditions and as a part of his business.

SPECIALIZATION.

In working out his problem, the farmer usually finds it necessary to do as other successful business men are doing, and specialize in order to make his poultry pay the largest profit.

The production of the favorite "south shore chickens" has become a business which engages the efforts and employs the equipment on hundreds of farms in south-eastern Massachusetts. Brahma and Plymouth Rock chickens are hatched in summer and autumn, and reared to be sold as roasters the following spring and early summer, when such stock is scarce and high priced in the Boston market.

This is a good illustration of special poultry farming by men who have sufficient enterprise to do things *differently* from the habitual way, when it proves profitable.

Farms devoted exclusively to egg production for market are not lacking, although their number is exceeded by farms on which the raising of broiler and roaster chickens is added to the egg production.

Boston furnishes the best market for fine quality of eggs and market fowl in the United States.

Some farmers who are naturally good salesmen find it advantageous to run retail routes, supplying fresh eggs and dressed chickens weekly to families, which pay good cash prices.

Another line of poultry culture which has been successfully specialized is that of duck raising. Examples of this branch of the business are seen in the large duck farms of James Rankin and of Weber Brothers of Massachusetts.

Another branch of water fowl culture practised with success and profit in New England is geese growing. On numerous farms of eastern Rhode Island and on some farms of south-eastern Massachusetts geese are raised by the farmers and sold to collectors in summer. The birds are prepared for market at large fattening stations, and sold as "green geese" in the great city markets. Massachusetts farmers in several localities might take up the raising of water fowl according to this simple plan with surety of adding to the present income of their farms.

The breeding of pigeons for the purpose of furnishing market squabs is a line of work which combines much pleasure with profit, and may well engage the attention of many a farmer or farmer's boy.

A progressive branch of poultry keeping which is becoming increasingly popular and profitable is the raising of breeding stock of one of the leading popular pure breeds of fowl, for selling to farmers and fanciers.

The fine products of exclusive White Wyandotte farms, Barred, Buff and White Plymouth Rock farms, Rhode Island Red farms, and Light Brahma farms, are more and more frequently advertised. "Farm-raised stock" is increasingly demanded.

The free range, wholesome food and fresh water of the farm enable fowls to develop in full degree the health and vigor which are considered desirable by the poultryman who must confine his fowls within the limits of close houses and yards.

Here is indeed a profitable field for the intelligent farmer who is a lover of fine fowls, and will take the pains to learn thoroughly and practically the principles of breeding which must be followed in developing the best birds of pure breeds.

INSTRUCTION.

How shall the farmer learn the poultry business? The best starter for any business life is faithful study in the Massachusetts common school, — the best of its kind in the world. If the poultryman has the advantages of higher education, they should prove helpful. The further training of many a poultryman has been gained by a life course under the direct tutelage of that dear but not always beloved teacher, — experience. Some poultry farmers are sufficiently wise to utilize as fully as possible the results of the experience of others. For those who find it possible to be away from home for a few weeks, there are open the advantages of one of the short courses in poultry culture now offered by several of the State agricultural colleges of New England.

Others who cannot for various reasons leave home may at least gain much valuable instruction by taking a correspondence course in one of the several schools offering special courses in poultry culture. This plan of home study under the guidance of experts in connection with continual interested practice on the farm is proving an effective means for thoroughly preparing the poultryman in his business.

The poultry books and periodicals are another source of information, which if wisely sifted and salted will help to make the industry of the poultryman progressive and profitable.

INVESTIGATION.

In order that poultry culture may be placed upon a firmer foundation of knowledge, further investigation and experimentation are necessary.

In the matter of incubation alone there is need of intense examination of the fundamental conditions. To-day the poultry business is based on average hatches of 50 per cent of the eggs incubated, and the raising of an average of 50 per cent of the chickens hatched to market size or maturity.

In the matter of breeding there is necessary a series of experiments, which shall demonstrate the actual application of the principles involved to the satisfaction of the practical poultryman, and enable him to manage his breeding birds according to established facts, instead of being governed by somebody's " say so."

In the feeding of poultry almost no research has been attempted, and no one knows to-day the degree of digestibility of even the common foods used for fowls. Further, there are required extended and exhaustive experiments to determine the practicability of raising and feeding to fowls such crops as Canada peas, soja beans, hemp seed, flaxseed, sunflower seed and other crops containing abundant protein (flesh-forming) nutrients, which may perhaps economically replace the nutrients of similar kind now supplied by the more expensive animal foods, such as beef scraps, meat meal, green bone, etc.

The special fattening or finishing of chickens for market by forced feeding has proved a decidedly profitable practice in England, France, Belgium and Austria. The Canadian government has taken up this matter in connection with the preparation of poultry products for export to the English markets. In the United States the process bids fair to be adopted and largely practised before even the agricultural experiment stations awaken to the desirability of investigating and experimenting in this line under American conditions.

The American hen appears to have been esteemed of too little importance by our State experiment stations to be considered worthy of study. A few intermittent attempts have been made to get at the facts bearing on some phases of poultry housing, feeding and management; but funds have been usually lacking, even when men qualified and interested were ready and eager to investigate to the foundation several important poultry problems.

Those who are pushing this great poultry industry need the knowledge, which they cannot search out for themselves because of lack of time, talent and funds for the same.

What is required is a government experiment station, amply equipped with men and means for searching out the unrevealed truths which, when they become known and understood, will be applied by practical poultrymen in a way to make poultry culture far more progressive and profitable than it is even in the hands of those most successful at the present day. Bacon said " To know well is to understand causes." When Massachusetts poultrymen come to know fully the causes which produce the results in breeding, incubation, brooding and in diseases of poultry, to-day unexplained and unexplainable, they will promptly demonstrate their ability to act on the knowledge gained, and furnish poultry products of the very highest nutritive qualities and in the most wholesome and palatable condition, at reasonable cost to the consumers and increased profit to the producers.

THE MANAGEMENT OF POULTRY ON SMALL FARMS.[1]

BY JOHN H. ROBINSON, EDITOR OF "FARM-POULTRY," BOSTON, MASS.

A large farm offers the best opportunity to keep poultry with little labor and comparatively large profits, but the owner of the large farm is not often much interested in poultry. It is the small farmers, under necessity of making the most of every opportunity to make money on their land, who are attracted by the possibilities of poultry culture. As personally and through correspondence I have for the last six years come in contact with owners and renters of small farms in the eastern States, and especially in Massachusetts, Rhode Island and Connecticut, who are trying to make a specialty of poultry, I have found that the most troublesome impediment to the development of their plans was the want of a method suitable to their circumstances.

A very large percentage of the small New England farms are of such dimensions and proportions that the fowls kept cannot be given liberty except at the risk of their trespassing on the land of neighbors. Because of this, many small farmers interested in poultry have adopted the intensive methods which small poultry keepers in towns often find necessary, but which large poultry keepers and farmers ought to avoid.

Intensive methods make the care of poultry a grind and drudgery, monopolizing the keeper's time to such an extent that it is almost fully occupied in caring for a few hundred fowls. Indeed, I have seen a great many people keeping poultry by such intensive methods that they hardly dared leave home for an hour for fear of disarranging their carefully balanced system, and could never by any possibility make a living by their methods if it became necessary for them to try to make their living from poultry. Many farmers who have adopted intensive methods and found them for a while profitable have neglected other lines of farm work; while others, unwilling to give time to poultry to the neglect of other farm work, have reluctantly given up the idea of increasing their stock of fowls. The best solution of the problem of the small farmer who wants to keep a few hundred hens, and still give most of his time to and use most of his land for other things, will be found, I think, in the adoption of methods intermediate between the intensive methods of the town lot poultry keeper and the free and easy methods which work well on large farms.

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[1] Agriculture of Massachusetts, 1903.

For more than a decade now the interest of poultry keepers has been almost monopolized by intensive methods. Periodically the colony system has been illustrated and described, and has attracted some attention; but outside of localities where it was developed it has as yet made little impression, though within the last two years interest in the colony plan seems to be rather more general and more persistent. Intermediate methods have been used in a number of isolated instances, yet few in comparison with the number of poultry keepers; and I suppose any one who would take the trouble to look the matter up would find that intermediate methods had not been as much neglected by writers on poultry matters as the failure of readers generally to become interested in them would be presumed to indicate.

Just why more people have not been interested in the methods theoretically best adapted to their circumstances is to me something of a puzzle. Perhaps it is because most of us are imitative, and prone to do things the way we see most of those about us doing them, or as those who seem to be successful tell us they do them. For some years now poultrymen have been keenly interested in the development of great egg producers, and in making records of large average egg production. Intensive methods are required to secure high averages, as well as to enable one to closely watch individual performance of laying hens. It has been customary to estimate profits in poultry keeping on the average difference between cost of feed and value of eggs or poultry produced, and to make comparisons of the work of different flocks on this basis, no figures being furnished for and no account made of the time spent in caring for the fowls and of differences in value or cost of labor. It has generally been taken for granted that the man or woman who could get the largest individual egg yield or the highest average was the most successful poultry keeper. However that may appear at first glance, it is easily discovered, by any one in a position to investigate, that the large egg yield is often obtained at such cost of care and food that, while the average profit per hen figures large, the poultry keeper's pay for his time figures small. It is a general fact, easily verified, that the poultry keepers who get the most satisfactory net results in money in most cases get only very ordinary egg yields. Their results are satisfactory, their work is workmanlike, and their venture stands on a business basis, because their modest results give good pay for time and effort required to produce them.

The man who has only a little land and can use it all for poultry and could use none of it for anything else will find intensive methods of poultry keeping the best for him; but I am convinced, from what I have seen of such plants, that as a rule the proprietors work harder for what they get, and are more tied to their work by the inevitable daily routine, than if they had more room and could use an easier system; and I rarely find one of these poultry keepers who would not gladly change to a location where he could have more room and an easier system. But, having once adopted the intensive system, a man whose land does not furnish room for a change cannot often make a change of systems except by changing location and making sacrifices he cannot afford to make. So he goes on with the intensive system, keeping many fowls on a small plot of ground, and doing for the fowls or working to compel them to do many of the things they do for themselves under more natural conditions. It is only so that in his circumstances and by his methods he can make a day's wages by a day's work.

By the colony system the owner of a large farm will distribute his fowls over the farm, and, by giving them room and range, relieves himself of the necessity of doing for them many of the things which the poultry keeper who uses intensive methods must do daily.

To illustrate: When fowls are confined in small yards, the grass is so quickly killed out, or at best so soiled by the fowls, that they eat only a little of it, — and that little under protest, — and do not get green food in quality and quantity proportionate to their needs, unless it is especially given to them. To get green stuff for a considerable number of fowls so confined sometimes taxes the ingenuity of the keeper, besides consuming time and occasioning more or less cash outlay.

Similarly with meat food. Fowls confined to small yards — either yards that are actually small or those that are small for the number of fowls occupying them — soon exhaust the supply of worms and grubs near the surface, and the occasional flying insects which come within their reach are as nothing compared to what they would get if foraging over a good range. To compensate for this lack, the keeper must provide something. Whatever he provides costs something in time or money, — often in both.

Then, as to exercise. Fowls at liberty naturally and voluntarily take sufficient exercise to keep them in good condition. They may take more exercise than is consistent with economy of food consumed, but the error is on the right side when looked at from the point of view of one who is trying to save labor. Fowls in confinement usually have to be compelled to take exercise. The grain fed them is buried in litter, and to get it they must scratch it out. Various other expedients to assure the keeper that the fowls will get needed exercise are in vogue. When the fowls are confined, compulsory exercise seems to be needed to keep them in good condition, — some experiments made to determine comparative merits of exercise and no-exercise systems to the contrary notwithstanding. Volume of egg production for a short period is not the only standard to be applied in making such tests. In matters of this kind the consensus of opinion of many intelligent and observant poultrymen, noting for themselves the general differences in results by the two systems, is apt to be more nearly correct than the conclusions of experimenters. Experiments have generally indicated no noteworthy advantage from exercise, when comparison was made of results of keeping similar lots of fowls under such conditions that one lot got its food without exercise, and, being confined, took no exercise worth speaking of, and another lot worked busily all day long for what food the fowls in it got. But in some of these experiments it would appear that perhaps the exercised hens had to take too much exercise for their good. Experience has roughly demonstrated that exercise (compulsory, when it would not otherwise be taken) is a practical if not an absolute necessity. I know a poultry farmer who keeps fowls through the winter without exercise enough to keep them in good condition. He almost always has eggs in fair supply in early winter and in abundance through mid-winter, but his hens are very apt toward spring to get too fat, to their detriment both as layers and breeders; and, though that is not the only cause of his troubles in growing chickens, it is one reason why he is less successful in that branch of his work than in getting eggs, and finds it harder to produce layers than to get eggs after he has got the layers.

To keep hens in good productive condition throughout their natural lives of usefulness, which in the laying hen should be two seasons and in the breeding hen three or four, regular easy exercise is essential. To give it to hens in confinement, the keeper must provide litter of suitable material, leaves, straw and coarse hay being most commonly used; and, removing the worn-out and adding new litter as required, must give no little time to that item of work the year round. In most parts of this State all fowls are confined to the houses much of the time during winter, and are better off if made to take some exercise. But fowls which have good range get all the exercise they need, foraging over it through eight or nine months every year, and during those months the keeper does not need to make special provision for exercise for them.

Besides the things just mentioned which must be done directly for the fowls, whoever keeps poultry in close confinement needs to keep houses clean and to turn over the earth in the yards at frequent intervals, and in small yards this work has to be done mostly with spade or fork. In all these ways the average time per fowl devoted to the care of a flock of poultry is increased; so that, while we find many poultrymen using intensive methods fully occupying their time with the care of 400 to 500 hens, we find farmers keeping hens on large farms on the colony plan doing the routine work of caring for 1,200 or more hens as a part of the morning and evening chores, and making more money actually, and very much more for time consumed than intensive poultrymen do, though the latter can show averages per fowl that make the common averages by colony methods look small.

Another point of difference between the two systems which should be emphasized in this connection is that, to be successful, intensive methods require much greater skill and more experience than are needed to make poultry keeping profitable under less artificial conditions. So it happens that, while the poultryman using intensive methods finds that, even with land, capital and the wish to extend operations indefinitely, he is limited by the difficulty, often amounting to impossibility, of getting help it will pay him to use, the colony farmer's operations are, generally speaking, limited only by the number of fowls his land will carry by his system. He uses ordinary farm help, — men who do the poultry work as "chores," and work in the fields through the day. Some of these men are, of course, better "hands" with the poultry than others; but the advantages of natural conditions offset all ordinary consequences of inefficiency to such an extent that the close supervision required on intensive poultry plants where help is employed is not necessary, and the average farm hand makes an average good poultryman.

I have given this extended illustration of differences between the system appropriate for the poultryman under necessity of keeping fowls in close confinement and that used by farmers, who, with only such modifications or elaborations as the scale of operations requires, apply ordinary farm methods to a large stock of fowls, because it is desirable that, before explaining the intermediate methods which suit intermediate conditions, we should have clearly before us the leading contrasts of the systems between which we wish to strike the happy medium.

What we are seeking — what I suppose four out of every five small farmers who become especially interested in poultry want, even when they don't fully appreciate what it is they want — is a method by which the farmer can keep as much poultry as possible without giving the poultry the detailed attention which must be given when the land occupied is stocked to the limit of its capacity.

The problem is neither a deep nor a difficult one. That it has been so seldom solved, and that statements of the solutions have attracted so little attention, seems to me to be due to the preoccupation of poultry keepers with other methods. However that may be, it is a fact more self-evident in southern New England than in any other section of the country that small farmers undertaking to specialize in poultry have almost invariably adopted intensive methods, and almost invariably to their own detriment, handicapping their efforts to make poultry pay, and frequently also handicapping themselves heavily in their general work.

I have seen farms by the score on which were poultry buildings and yards unused, except as a few fowls went through or stayed in at will, and rapidly going to decay; and I have seen other farms by the score where it was plain that the effort to make poultry pay was being persisted in almost hopelessly, and at the expense of some or all other opportunities of the farm; and this in the section of the United States, which, in my judgment, is favored above all others in the all-important matters of climate and soil for poultry culture, and good markets for poultry products. When there is so much of this to be seen, what wonder is it that people are continually asking, "Is there money in poultry?" and, when told that there most certainly is, ask, "Then why are there so many poultry plants standing idle, and so many for sale?"

I don't want readers to infer that I attribute to the use of inappropriate methods all the failures to make poultry pay on these New England farms. A good many of these unused poultry plants are monuments to inexperience, lack of capital or utter lack of adaptability to the work. Many of them are the sepulchres of foolish expectations of city-bred men, full of ideas and theories, but with no knowledge of or training in any of the pursuits of country life. It is not such failures as these that we are now discussing; it is the failure — or, where failure has not yet come, but seems impending, the situation — of the farmer who might reasonably be expected to make his poultry profitable, that just now concerns us.

The common trouble in these cases has been that, whether few fowls or many were kept, when the owners could not let them run at large because they would trespass on the premises of neighbors, they have gone to the other extreme, and, adopting the methods of small city poultry keepers and of exclusive poultry keepers, have put themselves in a position where they could not properly look after both the fowls and the other farm work. Generally all the work on the farm has suffered, in consequence.

It must be admitted that intensive methods present some features which in practice as well as theoretically are alluring to most of us. The plant is compact, and is generally so arranged that most of the work of caring for the fowls can be done under cover. It saves the attendant from exposure, and it saves steps. It seems to place us in the zenith of comfort, and offer us the acme of economy in labor. Let us look into it a little more closely, from the small farmer's point of view, keeping in mind the extra burdens which intensive methods impose on the one who has care of the poultry.

When one begins to plan to keep fowls by intensive methods, he first decides how many fowls he will keep, in how many flocks, and how many in each flock. Then he plans his house to fit the flocks, and makes his yards of width to correspond with the divisions of the houses, generally making them no larger than is necessary to get the minimum allowance of yard room per fowl considered safe.

The result is, that in nearly every case the yards, while sufficient if breeding pens of a few fowls each are kept in them, are entirely inadequate when the compartments of the house are stocked, as they usually are, to their full capacity.

The truth is that the parts of the system do not fit. The amount of yard room needed to keep fowls so that the poultryman can save on his labor cannot be had in connection with the pens in the long houses which are the principal feature of the intensive system. As the farmer who cannot let his poultry have free range must have yards, the obvious thing for him to do is to lay out and proportion his yards according to the size of his flocks, limit the total of fowls kept to the capacity of the land available for yards, make the houses of such dimensions as are required, and place them singly or in pairs, where they can be most conveniently reached by the attendant when making the rounds of the place.

This has been done here and there; but many who ought to use such a method have never given any attention to it, and quite a number who have been interested in it as they saw the system in satisfactory use have hesitated to adopt it for themselves, because they are reluctant to give up the compact, continuous-house plan, and because they think they cannot afford the expense of fencing large yards.

When large yards are used, the houses need not be very far apart. If, instead of a yard 18 feet wide by 75 to 150 feet long, which is about the way the yards range for a style of house which is quite common, and is usually rated as having a capacity of 25 to 30 fowls in each of its 10 by 18 feet sections, we make a yard two or three times as wide, the house arrangement would be either a separate house for each yard, or two-section houses placed so that the division fences between the yards with which the respective compartments connected would be on a line with the partition through the middle of the house.

Suppose we have yards 36 feet wide and 150 feet long; this will generally give ample yard room for 25 or 30 hens. If the lay of the land is such that the yard cannot be 150 feet long, the width must be increased to give the required area. With yards 36 feet wide and double houses, the distance between two houses is only 36 feet. If we have in a row four of these double houses, with eight yards, the distance from end to end of the row of houses is 252 feet, — 108 feet more than if the sections were all in one continuous house. If one builds houses that far apart, and makes the rounds of the plant as many times a day as some poultry keepers do, that 108 feet, doubled, because he must go to the end and return, can be made the basis of a calculation showing many miles traveled and much time lost because of the ground to be covered. But with the large yards it is not necessary to make these numerous daily circuits. Some poultry keepers who give ample yard room feed the grain to their fowls in hoppers in the houses, and, by using a hopper which needs replenishing only once or twice a week, find it necessary to visit the house at most only twice daily, and often make only one visit.

The method I am using on a three-acre place in a small town could be applied on a small farm, and make it necessary to go around only twice a day; though, because we have not far to go, we don't often try to combine the doing of several things when making one circuit. I will describe our way of feeding, a little farther on. Here I want to get back to the point of the expense of large yards. Four double houses, each accommodating 50 to 60 fowls, provide quarters for 200 to 240 fowls. To give these fowls the amount of yard room designated as sufficient will require no more cost for division and side fences than if the houses were all joined in one. The double yard area is secured by simply doubling the length of each end fence. Even supposing that the same height of fence was required, this extra cost of fencing would not be considerable, and would be insignificant when compared with the saving in labor effected by giving ample yard room; but it will be found that as yards are enlarged the height of the fence can be reduced, and thus it may be actually cheaper to make the larger yards. I have this year kept Dorkings with a fence only 3 feet high, and never had one of them attempt to go out, though they can easily fly a fence 5 or 6 feet high. Their yard is just as good as what lies beyond, and they are always fed there, so there is not temptation to go out.

When properly reckoned, the actual cost of large yards is not a heavy tax on the poultry keeper, and, comparatively, the smaller yard always costs more per enclosed surface. It costs a little more to build four two-section houses than to build one eight-section house, but the difference is not great. In yards of about the dimensions given as desirable, some a little larger, some a little smaller, I keep from 20 to 30 Light Brahmas, the number varying according to conditions and to the stock on hand. I aim not to have more hens in a yard than will leave it in this condition: for 15 to 25 feet from the house the ground will be quite bare; beyond this to about midway of the length of the yard the grass will be generally good, but short; the other half of the yard will have quite long grass, long enough to conceal grain thrown in it, and require the hens to hunt and scratch for their grain just as they do for the various wild seeds they find when foraging far and wide on open range. I am away from home nearly always through the day, and frequently not home until after feeding time in the evening. Occasionally I am away for two or three days or a week at a time, so I had to make such conditions for my fowls that they could be cared for with the least possible work, and would not suffer from inexperienced or irregular feeding. The hens get a mash in the morning, and often the noon feed of grain is scattered in the grass immediately after the mash is fed. That would be done regularly, were it not that the grain lying about attracts too many pigeons and sparrows. But whenever it would be inconvenient for the folks at the house to feed at noon, grain is given in the grass right after the morning mash, and, the hens having been given a supply of water for the day, there is no need of any one going near them again until evening. They can get along and keep in good condition without other green food and animal food than they get in the yards; but I like to give both hens and chicks all the meat they can stand, so feed beef scrap in mash regularly. The fowls at some time or other get all the waste green stuff from the garden; but in giving it I can consult my own convenience, knowing that they can get good green grass whenever they choose to pick it, and will not suffer if I find other things of more importance to do, and neglect giving them special feeds of vegetables for a long time. Quite a number of farmers I know handle fowls by methods very similar to those I use, the essential thing being to avoid conditions, a ration, or a routine that keeps the attendant constantly at the beck and call of some feature of the system.

In growing young chickens I cannot now make as satisfactory an application of the ideas described, because I have no guard against city cats, and keep chicks in coops while small; but a few years ago, when located where cats were no trouble, we gave the chicks the run of a small orchard, fed them a mash in the morning, kept cracked corn standing before them all the time, and gave other feed or not through the day, as happened to be convenient.

Given the right conditions, one can do this with both old and young fowls. The suitable conditions are found on almost all small farms, when either the fowls kept are given ample yard room, or the land which can be utilized for fowls is not stocked so heavily that its natural facilities fail.

I think we have disposed of the problem of feeding and watering, indicating how it can be done and the farmer left free to give the whole day between chore times to other farm and field work. Another problem that causes some trouble is keeping houses and yards clean. When the fowls are given large yards, the work of caring for them is very much reduced. The large yard on soil of the sandy character common throughout New England does not become foul. The droppings are well distributed over it, and the rains disintegrate them and leach them down into the soil, where they nourish the roots of the grass and trees. With the large yards, too, it is easier to take care of the houses, for the hens are in them less, droppings do not accumulate so rapidly, and it is not so necessary that there should be regular and frequent cleanings.

I use no droppings boards, and, by keeping the floors of the houses well littered with dry leaves, which absorb all the moisture in the droppings, find that I can let the droppings remain for weeks and yet leave the house free from bad smells, and, as the droppings are hidden in the leaves, cleaner to look at than half the houses I see that are cleaned daily. In winter I have let my houses go without removing the droppings for several months. I don't advise others either to do without droppings boards or to let their houses go so long uncleaned, unless they are sure they can control the situation. If there is much looseness among the fowls, it will not do at all to let droppings accumulate. With some kinds of litter the droppings cannot be allowed to accumulate. Dry leaves I have found better than anything else, if one has them in sufficient quantity to keep the litter always deep on the floor of the houses. In England many farmers use peat moss, and allow droppings to accumulate in it for nearly a year. In Rhode Island the colony-plan poultry farmers set a board on edge on the floor just forward of the outer roost, and throw dry earth, a few shovelfuls at a time, from the other side of the floor on the accumulating droppings. This accumulation of earth and droppings is removed once or twice a year. Poultry manure normally is of such character that if one takes proper care of it where it falls in the house it is not necessary that it should be promptly removed; and the small farmer, taking advantage of this fact, can arrange his roosts and their surroundings so that he can clean when convenient. He is not required to choose between taking time to clean the houses daily or having houses in condition to be ashamed of.

Poultry keeping ought to be an important feature on every farm, and a pleasant feature of farm work. It may be, if the farmer will only study to adapt his stock and his methods to the capacity of the farm under conditions satisfactory to him.

BREEDS FOR THE FARM AND FARMERS AS POULTRY BREEDERS.[1]

BY JOHN H. ROBINSON, EDITOR OF "FARM-POULTRY," BOSTON, MASS.

When I was a boy in Illinois, thoroughbred fowls were rare, and even less frequently found on farms than elsewhere. But there was one thing about the farm flocks in those days that I often think of with regret, that in the improvement of poultry stocks that feature has been lost; *i.e.*, the fowls in each flock and the flocks throughout each community were, in general, very much alike.

To be sure, there was not the uniformity one finds to-day in a lot of selected specimens from a stock of well-bred birds. The best specimens were not to be compared with the finest developed specimens of to-day, for either color, shape or size. Yet I am inclined to think that, aside from the matter of color, the average farm flock of those days was more uniform than even the average fancier's flock of to-day, and there are some breeds now popular for which I would not except color, either. Observe that I do not claim that the flocks of the old days were as good as those of to-day, — only that they were more uniform.

It is to be regretted that in the improving of flocks, which has followed the introduction of new breeds, uniformity in flocks and of the flocks in the same section have so seldom been retained. There have been so many new and improved breeds to select from, that as soon as people began to go outside of their own immediate neighborhood to get new blood, and to try to introduce blood that would improve their flock, those who had before used the same kind of stock began to use some very different stocks; and, as they still continued exchanging "roosters" and eggs with their neighbors, the result was that the flocks often became fear-fully and wonderfully mixed. The poultry stocks of the country, considered as a whole, continue so. There are here and there farming localities where nearly all farmers keep the same kind of fowls, and in some sections flocks of certain breeds are much more numerous than elsewhere; but there is not anywhere such greater uniformity and better general excellence as might reasonably be expected after two-thirds .of a century of improvement.

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[1] Agriculture of Massachusetts, 1904.

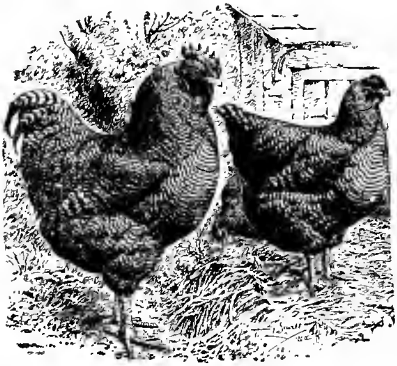
That this last statement is not in accordance with general ideas I am well aware. Any one who will consider the lack of uniformity in the poultry found in the ordinary farm flock, as well as in the ordinary town flock, and who will observe the small proportion of only fair-sized fowls, must admit that there are grounds for it. We need not, however, depend merely on observation. Here is an illustration. A few years ago I had a lot of Light Brahma hens I wanted to sell in a bunch, and at once, in order to get them out of the way. I could not sell them to any of the local buyers, because they were too large for their trade; so I asked a buyer in a section the other side of Boston, where Brahmas were bred more than any other fowl, if he could use them. He agreed to take them, and turned the deal over to a Somerville buyer, who sometimes made trips to my town. The lot of hens sold weighed at this time only a little over seven pounds apiece, average live weight. They had been laying heavily for between six and seven months, and were not in good condition. Four months before they were sold they would have averaged better than nine pounds, many of the hens weighing when in good condition ten to ten and a half pounds. When the man who came for them was weighing them, he remarked that they were the heaviest and largest hens he had had for a couple of years.

Talking about weights of poultry, one thing led to another, until finally he asked: "What do you suppose is the average weight of the fowls we buy?" I guessed, "About five pounds." "Well," said he, "the most of the hens we get weigh three to three and a half pounds. Hens that weigh four to five pounds we call large hens, and we get very few lots that will average four pounds."

Since then I have taken some pains to learn from other buyers — and to see for myself as I went about among poultry keepers — whether his statements were correct; and I have to conclude that they were, and that the average fowl of to-day is but a slight improvement over the best ordinary fowls of sixty or seventy years ago. Why is it? I think the answer is, there has not been the improvement of poultry generally that there ought to be, because the farmer is so seldom a poultry breeder.

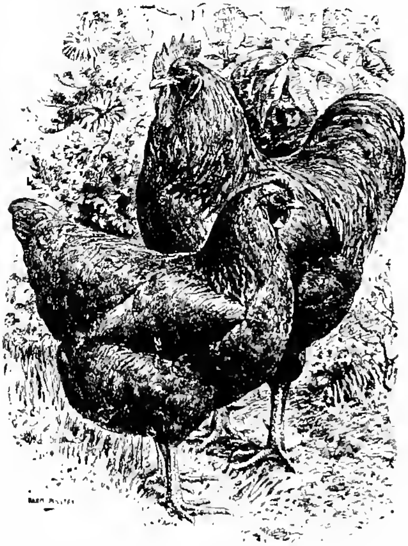
That does not indicate that farmers as a class are different from other poultry keepers. The ordinary poultry keeper, even the ordinary fancier, is not, strictly speaking, a breeder. But, inasmuch as the farmers produce by far the greater part of the country's supply of poultry and eggs (some authorities say nine-tenths of it), what farmers generally do or fail to do with regard to poultry is of vastly more importance than what the rest of the poultry keepers do or neglect to do; for, if all the other poultry keepers by general consent should adopt a course which would greatly improve their stocks of fowls, the effect on the whole market product would be small, as compared with the results if half or even a third of the farmers were to pursue the same course.

Most people who raise poultry are just poultry *growers*. They hatch the eggs of such stock as they happen to have. They keep on, year after year, reproducing fowls, without any definite ideas as to the particular points of excellence which it would be desirable to establish in their stock. They interest themselves little if at all in the principles of breeding; they follow no definite system. If they use some pure-bred stock, they give no special attention to preserving its characteristics. Oftener, indeed, such special attention as they give it is in the line of getting rid of whatever fixed character their fowls possess. The average poultry keeper has a perfect mania for crossing breeds, and nearly always he makes crosses without definite ideas about what he is likely to get, or what he wants to get. Then, not finding the product pleasing, he crosses again and again, until, becoming disgusted with his chickens, he either leaves them to breed together by chance, or gets some new stock and begins another series of crosses.



Pair of Ideal Barred Plymouth Rocks.

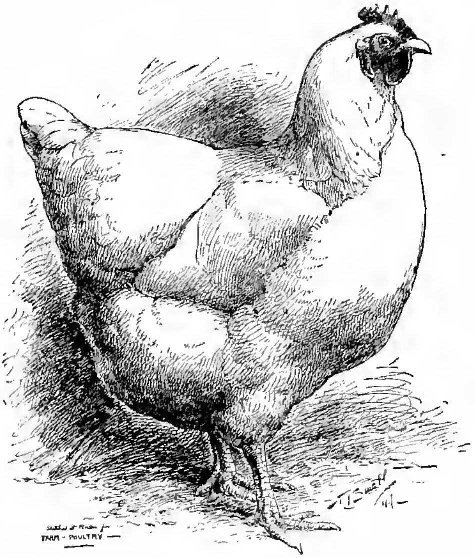
Poultry breeding properly consists in the intelligent, systematic mating of fowls to produce progeny having the desirable qualities of the parents preserved and if possible intensified, and the undesirable qualities either reduced or bred out entirely. A poultry breeder is not necessarily a fancier or a breeder of thoroughbred stock. One who works systematically and persistently for the development of common or grade stock is really more of a breeder than many growers of thoroughbred stock. If his ideas are good, and he is reasonably successful in his efforts to realize these ideas in his stock, he accomplishes more than most of those keeping thoroughbreds. I have known, first and last, a good many breeders who have made for themselves, from common stock, flocks of fowls in every practical respect equal to average good thoroughbreds. They were virtually pure bred, — as much so as many of the standard bred stocks.



Pair of Ideal Buff Plymouth Rocks.

But there are two serious objections to working in this way. The first is, that it takes very much longer to accomplish any desired results by breeding from common stock than by breeding from thoroughbreds. Though, as has been said, many thoroughbreds are by no means all that they should be, it is always possible to get specimens of some popular thoroughbred variety having the qualities one desires well developed; and from such stock as a foundation a careful breeder can accomplish more in three years than he could in three times as many years if he began with stock of no particular breeding.

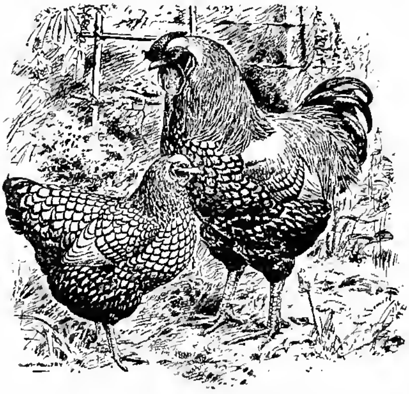
This is a point which has been demonstrated over and over. It is a point which needs to be emphasized often, for one of the most prevalent errors about poultry breeding is the opinion, held by many who have a very good idea of what they want, that they can develop it themselves by the careful improvement of inferior stock more economically than by paying the high prices which it is frequently necessary to give in order to get good stock of the type wanted. I would not advise any one who needed to consider economy — as most of us do — to buy fine breeding fowls in large numbers at big prices; but it is often the best economy to pay almost an extravagant price for a few good birds, to be used as foundation stock, rather than give time and attention to the development of a larger flock of less meritorious quality.



Ideal White Plymouth Rock Pullet.

The principle is exactly the same as that upon which a farmer or gardener, who wants some of a new variety of vegetable, grain or fruit, so expensive that he does not feel that he can afford to buy it in quantity, proceeds. He buys a small amount, and simply uses it as a foundation stock from which to produce seed or plants for a large crop in some future year. He should do the same way with poultry, and should have as much patience in working toward the results he wants.

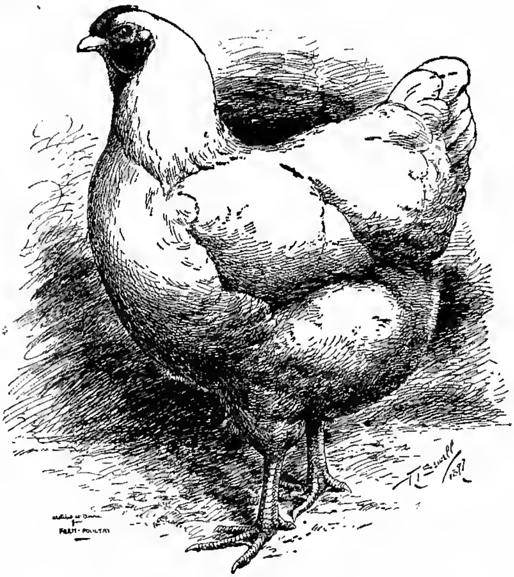
The second objection to developing common stock is that, in working along lines in which no one else is interested, one almost invariably comes before long to the place where he needs new blood; but, as he cannot get it from stock bred on similar lines, there being no other such stock, he has to either go without new blood or use something different. He has a choice of only two equally unsatisfactory courses. The dilemma is easily avoided by using fowls of a popular breed, in which it is always possible to get some such stock as one wants.



Pair of Ideal Silver Laced Wyandottes.

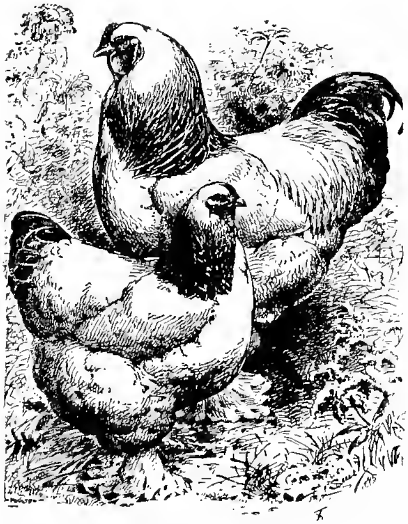
What puzzles the person who wants to get a few good birds to use as foundation stock is where to go to get such stock. He finds many breeders, all claiming to have just what he needs. If he is where he comes in contact with many people who have at one time or another bought stock from these breeders, he is very apt to come across one or more people who tell him of experiences with this, that and the other breeder that make him think he had better not risk an order with any of them. I get scores of letters every year from such people. They write to me supposing that I can tell them all about the different stocks, — which is good, which is bad; and about the breeders, — who is reliable and who is not. They say something like this: "I have only a little money to spend for fowls. I have had to save very carefully to get it, and I cannot afford to buy stock that will not prove satisfactory."

Now, I am so situated that I am not at liberty to recommend one man's stock in preference to another; and, even if I were at liberty to do so, I would be very reluctant to express an opinion as to the best place to buy stock of any particular kind, for I found out long ago that unless you know what kind of stock a man wants, and know that he too knows what he wants, advising him where to buy is too risky. If he is not satisfied with the deal, he blames you more than any one else connected with it. I can do better by the man who wants to know where to go to buy, by telling him how to buy.


Ideal White Wyandotte Pullet.

In the first place, he must know what he wants. If he doesn't know, he must find out before buying, and he must learn it so that he is sure of his knowledge.

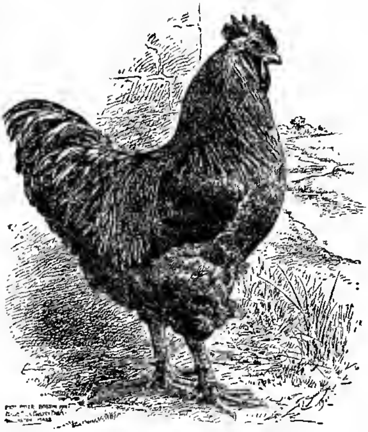
To illustrate: suppose a man concludes that he wants fowls for a certain purpose, and is told that White Plymouth Rocks would suit him. If he was brought up on a farm, he probably does not need to be told that all White Plymouth Rocks are not alike; for he has seen the production of plants and animals of many kinds, and has noticed that individuals from the same seed or the same parents vary sometimes a great deal. The first step, then, is to learn what is the correct type of White Plymouth Rocks. I think the best way to learn this is by carefully studying a good ideal illustration of a White Plymouth Rock. The ideal drawing represents a bird perfect, according to the artist's interpretation of the ideas of the best breeders and judges, in every section, — a bird free from faults. Sometimes photographs are obtained which are quite as good, and look more true to life; but the photograph so often fails to do typical birds justice in their best points, and so often distorts some sections, that I think it much safer for those who want to learn the best types in the different breeds to study the ideal drawings first, and so learn to make proper allowance for faults in specimens they see, and also in photographs and drawings that are portraits of individual birds, and hence show in some degree the faults of the fowls they represent.


Pair of Ideal Light Brahmas.

It will help one to appreciate the points of excellence in a breed if he will study, in connection with the ideal representation of it, the authorized description of the variety published in the "Standard of Perfection." This description tells him briefly what the drawing shows him, and by studying the two together he gets a better apprehension of the type than he could from either alone. From book and picture one who had never before seen a White Plymouth Rock could get an idea of it good enough to make it impossible for him to be imposed upon with fowls of different type, or with fowls having serious blemishes.

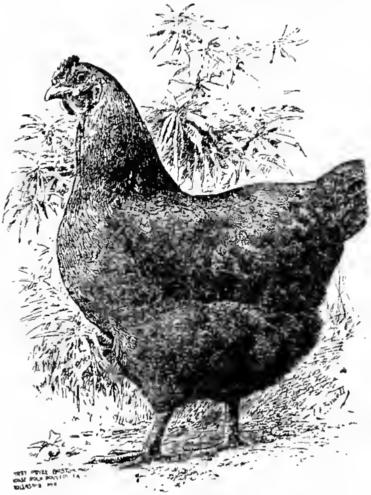
Even if one is somewhat familiar with a breed, it is well for him to justify his ideas of good type by comparing them with approved standards. Theoretically, the way to learn correct types would be by study of the best birds; but in practice the first knowledge of what is right is more surely gained by studying ideals, because by forming one's ideas from a model correct in all sections one avoids the common error of learning to overlook readily the weak points which may be associated with special excellence in the best birds he sees.

Having learned what a White Plymouth Rock should be, the seeker after good stock is now prepared to inspect some stock for the purpose of buying when he finds what he wants. I advise making a personal inspection of the stock from which one buys, and personal selection of the birds bought, if that is at all possible.


IDEAL SINGLE-COMB RHODE ISLAND RED, MALE.

With the ideal White Rock imaged in his mind, the buyer goes into a flock of White Plymouth Rocks and begins to look for specimens resembling that ideal. He knows that the type he is looking for is a rather long and deep-bodied bird, full-breasted, neither too low nor too high on the legs to look symmetrical. The picture he has studied has given him an idea of the general appearance and carriage of the bird; and if he has any eye for outline, he will at once single out of an ordinary flock some birds as typical and some as not typical. These typical birds, if on closer inspection they are found free from serious faults, and if they are vigorous and healthy looking, are the kind of birds he wants, and he should take no others. He should pay any price in reason for specimens of the right general type, rather than take as a gift specimens not of that type.

The fowls being satisfactory in appearance, the buyer naturally wants to know something of their laying capacity. For this he must usually take the seller's word; but if it is convenient for him to visit the place a few times before buying, and notice the eggs in the nests, he can form a tolerably good estimate of the general laying capacity of the stock, and get accurate knowledge as to how the eggs run for size, shape and color. If, as may happen, he fails to find any specimens in the flock that strike him as typical, the thing to do is to postpone buying until he can satisfy himself whether his judgment of the stock was right or not.


Ideal Single-comb Rhode Island Red. Female.

If he cannot buy White Rocks at home, it would be well worth his while to visit yards elsewhere in his quest for stock, and not under any consideration to buy until he can get what he wants. Even if he is unable to personally select his stock, he can protect himself in buying from a breeder at a distance by carefully stating what he wants, and insisting that fowls be shipped to him on approval. If he takes the necessary precautions to protect himself at every point from his own inexperience, as well as from the possible disposition of some with whom he deals to take advantage of his inexperience, a man runs little risk of parting with his money for fowls that are not what he requires. The risk cannot be absolutely eliminated, but it can be so reduced that the buyer is reasonably safe from loss. It may take him some time to find what he wants and to get started, but the delay is not lost time if he is learning to buy on his own judgment; for, as a rule, one has to learn to do that before he gets fairly started in breeding poultry, and it is much better and more economical to learn before buying than to learn by buying what you do not want.

Another point comes up here. Suppose one makes a fruitless search for fowls of the kind he had decided he wanted, — cannot run across birds that suit him, — but in the mean time does find birds of another variety that seem to him to be just what he wants; should he drop his first choice and take the others? Supposing a case as stated, I would say yes. The fowls which suited might not be the best type of their kind, according to prevailing opinion, but if they are what is wanted, the name by which they are called and their superficial points are of only minor importance. While I have used the White Plymouth Rock in the illustration above, any other Plymouth Rock is the same in everything but color. The Wyandottes and Rhode Island Reds are in the same class, and differ practically from the Plymouth Rock principally in size and shape, and not radically in either of these respects. Ordinarily, a Massachusetts or New England farmer would not want to go outside of these three breeds to look for stock. Indeed, this is the class of stock best adapted to the wants of most poultry keepers everywhere; and, as a rule, the preference of a poultry keeper for any particular variety of this class is due to his having happened to get stock of that variety which suited him.

A brief comparison of the three breeds and their varieties will indicate how like they are in essential qualities, and also show the superficial differences which would sometimes be considered in making a choice, and which in a few cases do have a marked influence in determining the popularity of the variety.

All are medium-sized fowls, the Plymouth Rocks as a class a little larger than the others, and a little longer in coming to maturity.

Of Plymouth Rocks there are three varieties, — Barred, White and Buff. Unless he had a color preference, a taste for appearance to satisfy, it would make no difference to the poultry keeper who wanted a fowl of the Plymouth Rock type which of the three varieties he took.

In Wyandottes the number of varieties is greater, and most of them are more difficult to produce in such uniformity of color as will satisfy even a moderately critical taste. The White and Buff Wyandottes are the only varieties of the breed which the farmer looking for stock would do well to consider, if he found what he wanted. Of the other varieties, the Golden Laced, Silver Laced, Partridge or Golden Pencilled, and Silver Pencilled, are difficult to breed; and the farmer who is not something of a fancier would not long be suited with them. The Black Wyandottes are comparatively rare, and their color does not recommend them to many practical poultry keepers. The Columbian Wyandotte, with markings of a Light Brahma, should make a first-class variety for the farm. The present objection to recommending it generally is that the breed requires very careful breeding to bring it to such stage of color development that the average novice in handling the variety will get encouraging results in that feature. Of course the novice, in handling any variety, as in doing work of any kind, makes mistakes at first. It takes a year or two of experience in breeding to learn to avoid the most serious mistakes. But the poultry keeper who wants to make himself a good breeder of fowls will succeed better by beginning with well-established varieties, because then his first and hardest year's work is not made more difficult by lack of development or permanence of the special characteristics of the varieties he is working with.

The ideal Rhode Island Red is of a type intermediate between the ideal Plymouth Rock and Wyandotte type, but comparatively few specimens have yet been produced showing that type conspicuously. The average Rhode Island Red resembles the average Wyandotte more than it does the Plymouth Rock. There are two varieties, the Rose Combed and the Single Combed. A third variety, Pea Combed, like a Brahma, is bred by a few breeders, but has not attained a popularity at all comparable with that of the other two, which in many sections of New England seem to have matched the popularity of the popular varieties of the Plymouth Rocks and Wyandottes.

For usual farm conditions in this country no other breeds need be considered. In the section where soft roasters for the Boston market are grown on a large scale, Light Brahmas are very generally kept by farmers to supply growers of this class of poultry with eggs for hatching.

Having obtained stock suitable for his requirements, the farmer is ready to begin his work as a poultry breeder. The difficulty of getting just such stock as he wanted will generally have convinced him by this time that there is not nearly as much of it produced as there ought to be. There ought not to be any considerable proportion of the poultry produce each year that did not in a general way fill most of the requirements for a good fowl for the farmer. Allowing for differences in size and in purpose, it is still true that, whatever the variety or whatever the purpose in breeding them, the aim should be to produce well-developed, healthy, vigorous fowls, and that these points should always be considered first.

For the fancier, to whom superficial qualities, such as perfection of comb or crest, or excessive development of foot feathering, or accurate markings, or purity of color, seem of prime importance, and really are made so in the competitions for which his birds are produced, we can find some excuse for sacrificing the substantial qualities of fowls to the superficial, or for being so impressed with features that are for the time being a fad that he neglects the preservation and development of useful characteristics; but the farmer, as a breeder, has no excuse for not developing in his fowls the qualities of most value to him, and, having once clearly apprehended for himself what these qualities are, all his efforts as a breeder should be directed to making them uniform in his flocks.

It does not take long to do this, if he can bring himself to adhere rigidly to the fundamental rules of good breeding, *i.e.*: —

First. — To breed only from the best obtainable specimens, following this rule year after year; demanding that his breeding stock as individuals shall have the merit he seeks in themselves as well as in their ancestors.

Second. — To give the chicks of his breeding stock the care and food necessary to make them attain their best possible development.

In a previous article on poultry keeping for the farmers of Massachusetts I had occasion to refer briefly to the fact that, as a rule, farm-grown stock did not attain the best development possible. I would not go so far as to say that the best development is to be sought for all the stock produced on the farm, regardless of the cost of obtaining it, though I think better development than is usual could be obtained on many farms at an insignificant cost; but I would by all means urge every farmer who wishes to improve his poultry to give to chickens, from which his stock birds will be taken, all the attention that they need to bring out all the merit there is in them.

Beginning with good stock, breeding carefully and growing his fowls well, a farmer can in a very few years have a stock of uniform high excellence that will be an ornament to his farm, will be far more profitable than the old, carelessly bred stock, will be a source of pride to him, and stimulate his neighbors to follow his methods.

And here we come naturally to the consideration of another point, — the relation of the farmer as a breeder to other farm poultry keepers, especially to those in his immediate vicinity. It is of quite as much advantage to him to have his neighbors generally keeping just as good fowls as the fowls he has improved to his liking. One may take a selfish sort of pride in having better poultry than those about him, but it is not really much to his credit, unless they too have good poultry. It is to the advantage of the farmer and breeder of poultry also to have the kind of poultry he keeps popular throughout his vicinity. I doubt whether there is any one condition affecting the improvement of poultry which has a surer and steadier influence for the preservation of practical qualities than to have the stock almost universally kept in a locality, and all the poultry keepers alike interested in getting practical and profitable results.

It remains to speak of the satisfaction of breeding poultry. The mere grower of poultry gets little pleasure out of his work with it. The breeder always finds something in his work to compensate for the drudgery of some of the tasks of caring for poultry. His fowls begin to assume an individuality in his sight and in his thought. Each succeeding year he becomes more adept in anticipating the quality of the chickens he will hatch, even though he may make no progress in counting them before they are hatched. Nor is the use of what he gains by intelligent efforts in breeding poultry limited to his work with poultry. In learning to work with the principles of breeding, he is providing himself with a better equipment for every other branch of his farm work, for the same general principles of production run all through the animal and vegetable kingdoms.

PRACTICAL POULTRY HOUSING.[1]

BY JOHN H. ROBINSON, EDITOR OF "FARM-POULTRY," BOSTON, MASS.

At several of the farmers' institutes in this State which it has been my privilege to address during the past year, the description of some poultry houses I am using and explanation of reasons for using them has excited enough interest to make me think farmers throughout the State may be equally interested in that subject.

The ideas and principles upon which this method of housing poultry is based are not new, nor are they at all novel. On the contrary, they are very old and very common. The noteworthy thing among them is that they have not until within a few years seemed to those looking for the best ways of housing poultry to be worth serious consideration. For several years now they have been much discussed in the poultry press, and the general interest in them and increasing tendency to use them marks what is probably the last stage in the reaction from the plans and methods most in favor since the interest in better results from poultry culture began to assume its present importance.

For a great many years authorities on poultry keeping have advocated warm, tightly built poultry houses. They have held that, inasmuch as hens naturally laid best during the spring, the essential thing (if one wanted to get eggs in winter) was to reproduce spring conditions, especially temperature. So, with double and triple walls, with dead air spaces, with double sash on the windows, with large windows to admit as much sunlight as possible by day and with roosting rooms and closets to shut the fowls up close and keep them warm in at night, they have tried to approximate spring conditions. In a degree they have succeeded, as far as temperature is concerned, — that is to say, they have succeeded in maintaining a higher temperature in the poultry houses than is usually found in out buildings for live stock. They have protected the fowls from the extremes of winter weather.

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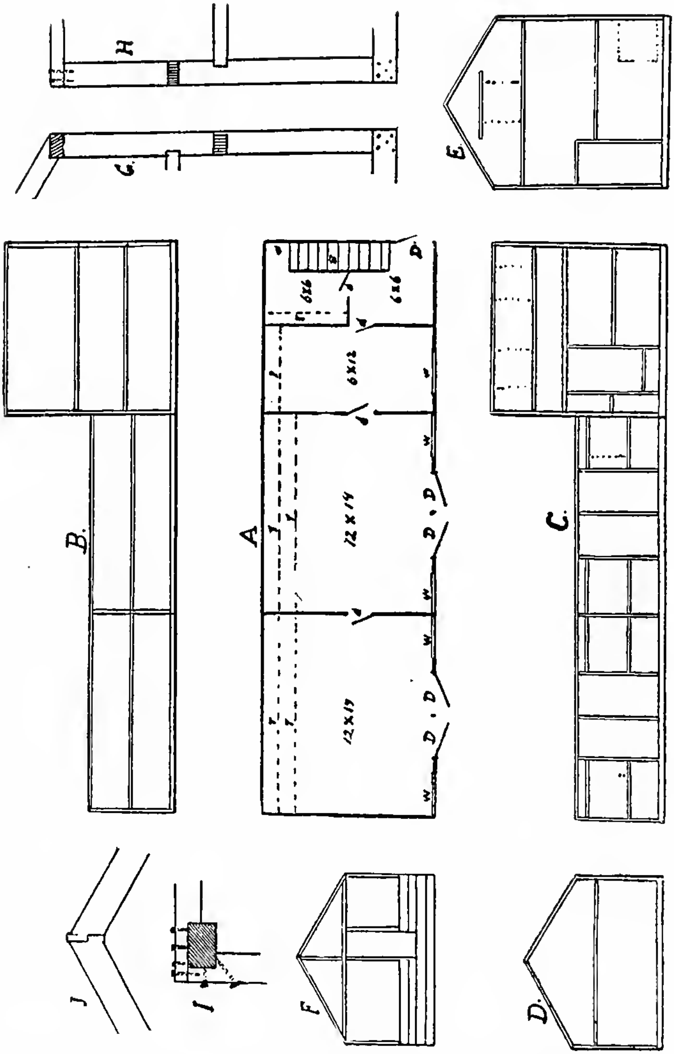
[1] Agriculture of Massachusetts, 1905.

But the temperature is only a part of spring conditions. In spring and summer fowls have, with the higher temperatures, abundance of air in the houses, and live much out doors. The out-door temperature and the temperature inside the house are not much different. In the house it is cooler on a very warm day and warmer on a cool day, but the difference would rarely exceed eight or ten degrees either way.

Building used in J. H. Robinson's First Cold Poultry House Experiment.

In winter, if the house is to be kept at a much higher temperature compared with the out-door atmosphere than at other seasons, the house must be shut up, and there must be no free and rapid circulation of air between the exterior and interior, except when the out-door temperature is high; for free circulation of air when the outer temperature is low will reduce the temperature in the house to within eight or ten degrees of the outside temperature, and if the outside temperature is zero, or ten, twenty or more degrees below, this makes the inside colder than, on the theory that the house should be kept warm, is advisable.

To keep the temperature in the house up as high as required by this theory of housing, the house must either be



Plan of Poultry House used in J. H. Robinson's First Cold House Experiment.—This building consists of two parts,—a two-pen house 12 feet wide by 28 feet long, and a two-story part 12 feet square, with small pens on ground floor and room for pigeons, storage or other special use overhead. The low part is 6 feet high at the eaves, the other 12 feet. A, ground plan of house; DD, outside doors; dd, inside doors; ww, windows; rr, roosts, s, stair; B, outline of frame work of rear wall; C, outline of frame of front wall; the dotted lines indicate the position of the windows; D, outline of frame of west end; E, outline of frame of east end; F, an inside partition between pens; G, framing of west end at corner post; H, framing of back at corner post; I, framing of posts and sills at corner; J, method of roof construction at peak, explained in the text.

kept shut so close that the heat from the fowls keeps up the temperature, or must be heated artificially.

Artificial heating in houses for laying stock has been tried many times, but generally discarded as unsatisfactory, and not giving returns to justify the expense. In central New York some of the large egg farmers who use S. C. White Leghorns to produce eggs for the New York city market keep stoves in their houses, but I know of nowhere else where it is generally done.

When a house is kept shut close enough to keep the temperature up by the heat from the fowls, proper ventilation becomes at times impossible. Under some conditions the house cannot be kept warm with the heat from this source, and at the same time the air in it renewed as often as it should be. When only the nights are cold, or occasionally there is a day so cool that it is thought best to keep the house shut up, no serious bad results develop. But when there are several days of continued cold weather, with the houses shut all the time, conditions inside the houses begin to be bad; and if — as sometimes happens — cold and stormy weather is prolonged for a week or more, conditions in the poultry house become very bad, the walls and under side of the roof drip with moisture, and the air becomes bad. Under such conditions roup often develops and becomes epidemic; or, where no virulent disease appears, the fowls are catarrhal, debilitated and unproductive.

It is often said that roup and kindred diseases were rare in old times, when most of the stock in the country was mongrel or old barnyard stock, and when all the attention the average poultryman gave to selection for breeding was to swap roosters every year; and many attribute the trouble to in-breeding, and to a greater liability to disease in thoroughbred fowls. I think it is due more to other causes, and as much to tight, badly ventilated houses as to any other cause, or perhaps to all other causes combined. Certain it is that in a great many instances in the last few years opening up the poultry houses and giving the fowls pure aid in abundance by night as well as by day has been followed by a marked improvement in the general health of the flock.

My own experimenting with cold and open houses was undertaken to show what was possible under conditions quite the opposite of those generally recommended as necessary to good egg production and healthy stock in winter. I was constantly receiving inquiries from poultrymen having trouble with damp houses as to how to remedy that condition; and, as I visited poultry plants in winter, I almost always found the houses damp, badly ventilated, and overheated about midday even of quite cold days.

I think that in most cases conditions need not have been bad had the poultrymen used ordinary judgment in opening doors and windows. The common practice was to keep houses closed in winter except on very bright, warm days, and then open them either only for a little while in the middle of the day, or open them toward midday and leave them open until dark. Very often it would happen that houses were kept closed tight all day on a bright day, when the sun shone warm during the middle of the day and made the poultry house as warm as a green-house. Frequently the poultryman kept doors and windows shut nearly all the time, relying upon his ventilators to supply fresh air. That the ventilation did not work as theoretically as it was supposed to work was generally plain to any one who stepped into the house, — except the owner. Where the intention was to ventilate by means of doors and windows, opening the house up gradually in the morning and gradually closing it in the afternoon, the system rarely operated as planned. Such a plan, if faithfully put in practice, works well except for long-continued cold weather, when the short time the house may be opened is not long enough to thoroughly air and dry it; but I have seen very few plants on which this plan of ventilation was operated as it should be. On most plants it is attended to very irregularly, and often neglected for days while the poultryman's time is taken up with matters which seem of more pressing importance. Such a system of ventilating requires more time and attention than many poultrymen are able to give it; hence, is not for them a satisfactory system.

There was no guess-work or theory about my opinion that most poultry keepers would not give the ventilation of tight houses the attention necessary to make them satisfactory. Almost everywhere I went in winter I saw it, and found also that the worse conditions became in tight houses, the more afraid were the owners to let the air into them.

Various ways of preventing dampness in a tight house have been devised. Thick walls, double or triple, with air spaces or linings between, will not frost inside in cold weather as the single walls do. Some poultrymen make a loft of the space under the roof above the plates, and fill or partly fill it with hay or straw, which will absorb the moisture and keep the room dry.

Such devices, however, do not solve the problem of fresh air. It is practically impossible to keep a poultry house shut up so that the heat from the hens will keep it warm, and at the same time have the air in it renewed as it should be. If the building is large in proportion to the number of fowls kept in it, the heat from them has no appreciable effect on the temperature of it. If it is small enough to be kept warm by as many fowls as its floor space will accommodate, the air in it soon becomes vitiated. As I had occasion to look at the subjects of warmth and ventilation in the light of the experience of many different people, I began to think perhaps the prevailing ideas on those matters were not correct, and to ask myself whether it were not possible to get better conditions and satisfactory results in houses of a different kind.

To this question I found an answer that satisfied me in the large number of instances I could collect from memory, where as good results had been obtained in cold, poorly built houses as the average results in warm houses, and in the few instances where exceptionally good results had been obtained under conditions that we had been accustomed to regard as very bad. Such occurrences had, of course, been considered in the forming of the general authoritative opinion as to the requirements of winter poultry keeping, but were usually considered as exceptions that proved the rule, — a very convenient way of getting around facts that do not accord with theories.

But, however convincing the evidence a man may gather in this way may be to himself, it has not much weight with others; so, instead of publishing the results of my thoughts, I went to work, built a house that in several important features was quite contrary to the prevailing ideas of what a poultry house should be, and used it for nearly a year before saying anything publicly about it.

This house was a mere shell or shed; the walls were of common hemlock boards, laid perpendicularly on a light frame, and the joints between the boards covered on the back and ends of the house with common battens; the joints on the front were left open. The roof was of shingles, laid on strips of furring placed three inches apart.

The house was not tight anywhere. As I used it the first winter, — it having been built in a hurry late in the fall, — the battens were merely held in place with two or three small nails in each, and where loose enough to let a great deal of air in around them. The cracks in the boards, some quite large, were not covered at all. The front of the house had double doors six feet wide in each section, and these were kept open all day unless a storm would beat in, and all night except on very coldest nights or nights when storms would drive into the doors.

The house was built on wet ground, — that is, ground that was thoroughly soaked by the late rains. After the roof was on, the ground in the house was spaded up; and when the house, a few days later, was ready to put the fowls in, the surface of the ground in it was dry, but a mere scratching of it would show damp earth. By spring there was about two inches of dry earth on top, and the soil damp below that. The walls in the house were dry, — never a bit of moisture on them except as a driving rain might wet through the joints and cracks. This would dry out quickly, and I never noticed any ill effects from it.

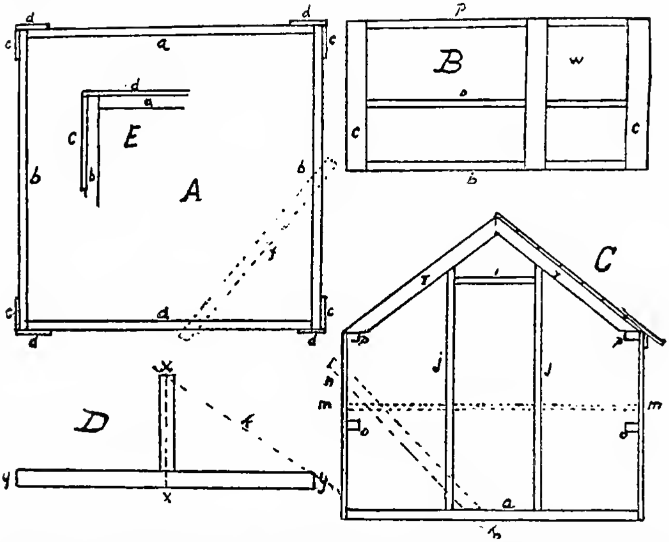
The house was cold, — the temperature in it was but little higher at any time than that out doors; yet going into it I noticed that it always felt comfortable, with a feeling like what you get in a warm, sheltered spot out doors, — not at all like the warmth of a heated building.

The hens always seemed as comfortable in it as I ever saw hens anywhere. There were some fifty to sixty in it that winter, and only two slight cases of colds, which recovered immediately with no treatment but a single application of vaseline to the head. The egg yield was fair, comparing favorably with average good reports. The hens in this house were Light Brahmas. I published a report of experience with this house, and on the strength of my experience with it began to urge correspondents who had much trouble with damp houses or unhealthy fowls to open up their houses, and keep them open at all seasons.

House in which Light Brahma Pullets were kept.

The next year I continued to use this house the same way, but put in a part of it a pen of Silver Dorkings, a breed reputed to be rather delicate and susceptible to cold, and having combs which would be more quickly affected by the frost. I also built another smaller house, on the same principle, and put in it a brood of late-hatched Brahma chickens. The Dorking male had his comb very badly frozen, but the hens' combs were scarcely nipped at all. They were put into the house December 1, began to lay in about three weeks, and laid well all winter.

The brood of chickens hatched June 27 that I put in the small house in October made a remarkable record for growth and early maturity. I got the first egg January 15, and by February 1 all the pullets, nine in number, were laying; and from that time until February 22, when I took some out to put in my breeding pen, the nine pullets were giving me about a fifty per cent egg yield, and still growing. I weighed them all on February 22, and found five of the nine weighing nine and one-half pounds or over, and none of the others much below it. These pullets were not fat; they were big pullets, in good condition. Their house, as shown in one of the illustrations accompanying this article, was battened only on the back and half way forward on each side. The door was open practically all the time, day and night; and the windows were always partly open except when a storm came against one, when that one would be closed.



Details of Construction of House shown on p. 57.—This house is 8 feet square on the ground, 4 feet high at sides, 7 feet in the middle. Cost about $12. A, sill plan, with position of corner boards indicated at c c c c, d d d d; E, construction of a corner; B, side; C, front; D, method of cutting pattern for rafters.

The next winter, still continuing to use the houses I had already built, I built on frozen ground late in November a house very similar to that in which the Brahma pullets just mentioned had been kept. It was made of old material, and was a little poorer in construction all around than the other house, joints between sides and roof not as good, and some very wide joints between boards in front. Into this house I put my Dorking hens and pullets. This winter, 1903–04, was, as all know, a record-breaker for cold and snow. Frequently after a night of driving storm I would go to this house and find so much snow sifted through the joints at the back that there was a light sprinkle of it all over the litter on the floor, — so much that the hens would not come down from the roost until the litter had been shaken up; and the backs of the hens as they sat on the roosts were well coated with snow. The tips of the hens' combs were somewhat frosted (no male was put in the house), but these hens gave me about a forty per cent egg yield in January, 1904. There were very few hens in any kind of house anywhere doing better at that time.

During the several winters covered by the experiments mentioned my fowls were cared for by myself when at home, at other times by different members of the household, none of whom had any particular interest in or skill in feeding fowls. Our one rule for feeding was to be sure that the hens had an abundance. In the first half of the winter I had to be away so much that I found it impossible to keep accurate egg records. When I relied on others, they forgot; and so I gave up thought of making statistical figures complete, concluding that circumstances limited me to general demonstrations of a few leading facts, and the exact results possible in cold houses and comparison of these with results in other houses would have to be left to others. My trials demonstrated that hens could be kept healthy and giving average good egg yields in cold, open houses. So far as I could judge, they consumed no more food than when kept in warm houses, though theoretically it should have required more.

Last winter the only item of experience in my poultry yard having a further bearing on this subject was the performance of a pen of July-hatched Single-combed White Orpingtons. These were put in an old poultry house that was sheathed, papered and covered with common lapped siding on the sides and with shingles on the roof. The front of this house was about half glass, an immovable window, and there was a half-window in each end, the door being at the north-west corner. The growth of an apple tree near the house had forced a board from the front next the roof, and there was an opening here the length of the house wide enough "to throw a cat through." The west window was wide open all winter. The pullets in this house had been sold early in January, and, as I was expecting to ship them any day, we kept no record of their laying. The buyer failed to take them; but, as I still intended to let them go, and as some weeks had passed with no records kept, we let them go along unrecorded. Through January, February and March these pullets, nine in number, laid rarely less than seven eggs a day, and often nine for several days in succession. Nearly all their combs were somewhat frosted, and the comb of the male at one time quite badly frosted.

Now, of what use was it to demonstrate that warm houses are not essential to egg production, and that hens can be kept healthy and productive in very cold houses?

I went to the extreme, giving my fowls houses that were mere shelters, to show more convincingly, by extreme illustrations, that warm houses, which are more expensive to construct and require more careful attention to operate, were not absolutely essential. My tests, though not furnishing statistics, do show conclusively that egg production is not necessarily dependent upon "spring" conditions; and that the cold, open house for poultry is the style of house in which the labor of caring for them can be reduced to the minimum. Considered in connection with the general difficulties with tight buildings, they indicate also that the safest and most profitable and practical type of house for most poultry keepers is the house that is so constructed that it does not require close attention from the poultry keeper to keep conditions in it safe. They have not developed what is the best construction of house. It is reasonable to assume that a little better construction than I have used would be better, — would afford more protection, without making conditions that interfere with the steady renewal, in abundance, of supplies of fresh air.

Between the house so tightly built that the ventilation in it is very bad, and one so open that the temperature in it is but slightly higher than out doors in extremest cold weather, there is a medium form of construction and an intermediate in methods of operation, which will give more protection in the house without reducing too much the circulation of air in it. I think this medium form of construction must be much nearer the cold than the warm plan of housing; for when air is admitted freely, as it should be, the house cannot be kept very warm; and when the house cannot be kept warm, it is superfluous to make walls thick, and adds unnecessarily to the cost of construction. A wall of inch boards covered with a good building paper is as tight as if it were a foot thick. If a house is built with tight back, ends and roof, and has wide doors and good-sized windows in front, and doors and windows are kept open as much as is necessary to prevent moisture from collecting on the walls and lower side of roof, the air will be good in that house, and the fowls healthy as far as health depends on good air. In a cold climate, such a house will be cold, — not as cold as outside, but still a cold house.

The special interest farmers have in this plan of housing fowls is in the demonstration it makes of the fact that there may be good egg production in a cold house; and that one need not despair of getting eggs in winter because his poultry houses are cold, or think that when he fails to get eggs in winter it is because his houses are cold. On most farms at present the poultry houses are of the class of those I use; and I find a great many farmers have been under the impression that it was useless to put forth special efforts to get winter eggs from poultry in such houses. The fact is that the house is not a matter of prime importance, except that in a warm, tight house that is kept shut up too much the hens are more likely to go out of condition and fail to lay than in a cold house; and, again, hens that do lay well in a warm house are apt to become debilitated and weak, and unfit for future usefulness either as layers or breeders.

The thing of first importance in the production of winter eggs is to have the fowls ready to lay about the beginning of winter; after that, the point of greatest importance is to feed well. These are the things without which you cannot get eggs until they are full grown. Old hens do not lay profitably until they have molted. Both pullets and hens in laying condition must have food enough to maintain themselves, and enough more to convert into eggs. In the spring a hen may produce eggs at the expense of her maintenance, but in fall and early winter she will not, as a rule.

The principle which the possibility of good results in cold houses and the successes and difficulties with hens in warm houses combine to establish is this: given hens in laying condition, and abundance of proper food, egg production depends on uniformity of conditions more than on high temperature.

Such uniformity of conditions is more easily secured in a house that is not much different in temperature from the outside air than in one that is kept much warmer than the outer air in extreme cold weather. In the open house the variations of temperature are less than in the house that is kept warm in coldest weather, unless the ventilation of the warm house is looked after much more closely than is customary. The open house does not need close attention. The fowls in it are hardened, — accustomed to a lower range of temperature than those in warm houses. Because of this, and because, breathing always pure air, their vitality and capacity to stand changes in the weather are greater, they are less affected by weather changes than fowls in closed houses.

To their better circulation and greater vitality also I attribute greater perfection in bodily functions, as seen in the greater fertility of the eggs from such fowls, and in the apparent fact that they get more nutriment from the food they eat. As I said a little while ago, I could never see that the fowls in the cold houses took any more food than fowls in warm houses. Since I began the experiments mentioned in this article a great many have been making observations along the same line, some independently of and without knowledge of what I was doing, and others because of the interest discussion of my tests excited. The general verdict of these is that no more food is consumed in the cold houses.

Some say the fowls in the cold houses seem to eat less; a few affirm that they do eat less. Such statements seem at first thought improbable, yet they are not, on consideration, wholly unreasonable.

It is a fact which any one who has the opportunity and cares to take the trouble can easily demonstrate for himself, that dwarfed and stunted chickens eat as much as well-growing, hearty chickens of the same lots, yet hardly show any increase in size, while the others are growing rapidly. Long after the thrifty chickens have grown out of all comparison with the runts, if you separate them you may find the little runts eating much more in proportion to their size and rate of growth than the others, and often eating actually as much as the others. Why is it? Simply because digestion and assimilation are imperfect. The chick is ill nourished, not because it does not get enough or the proper variety of food, but because its system does not do its work properly. Much of its food passes through it undigested. So with the fowl which breathes impure air. Its functions are sluggish. Its circulation is poor, as often shown in the chilled comb and the general air of listlessness. It is reasonable to suppose that digestion, too, is impaired, and the fowl gets less nourishment from a given quantity of food than it would if all functions of the body were in a higher state of activity. From this point of view, the observation that hens eat no more, and may eat less, in cold houses, seems worthy of some credit; and it begins to be doubtful whether there is actually, as theoretically there has been, an economy of food in using warm houses.

The strongest point that can be brought against the cold house for poultry is that it is not suitable for fowls with large combs and wattles easily affected by frost. This point has not so much weight with farmers in this State as in places where Leghorn and Minorca fowls are kept, because white eggs are wanted. Here most of the fowls on the farms are Plymouth Rocks, Wyandottes or Rhode Island Reds. The combs of the hens of these breeds are not easily affected by frost. Many of the male birds are almost as easily frosted as Leghorns. Where only a few males are needed they can be removed to warmer quarters on very cold nights; but with birds not intended for exhibition, or for sale for purposes where a frosted comb would count against them, I would let the comb freeze and the bird lose a part of it. It seems a cruel way, yet on the whole is more merciful; for, if the bird is properly taken care of after the comb is frosted, it does not seem to suffer much, the comb soon heals, the frosted tips drop off, and the bird is thereafter practically immune from frost bite, and the keeper does not have to give it special care.

I make the foregoing suggestion to those who have male birds with moderately large combs, and want to use cold houses. I would not advise it for fowls with very large combs, which if exposed would lose most of the comb. The best way is to keep fowls with small combs not easily frosted, or if one thinks he must have large-combed fowls, to select for breeders those least susceptible to frost. There is a great difference in individual birds in this respect. I have had Leghorn males with very large combs that were never frosted, though repeatedly exposed to temperatures at which other Leghorn males and many males with smaller combs were quite badly frostbitten. A few people using cold houses for Leghorns report that their Leghorns that have been all their lives kept in such houses do not suffer as much from frosted combs as the same stock in closed houses. While I would not deny that they may be correct, it seems to me that conditions with them must be more moderate than in this section, or the houses were not as open as those I have been describing. As a matter of fact, large-combed males are a deal of trouble where the winters are cold, no matter what kind of a house is used; and practical poultry keepers, whether on farms or elsewhere, will find it to their advantage to breed for small combs. There is, I know, a very general belief that the largest combed hens are the best layers and the largest combed males the most vigorous sexually, and hence the most useful as breeders; but I think this impression erroneous. The best-laying Barred Rocks I ever owned had combs so small that the development of the comb as the pullets began to lay was often not noticeable.

In Leghorns I have never found the size of the comb at all reliable as an index of laying capacity; my good layers of that breed have had large, medium and small combs, and I have found all degrees of productiveness in all kinds of comb but one. There is a type of comb most conspicuous in Leghorns and other large-combed fowls, but found in all classes of fowls but those having very small combs, that I believe is a sure index of lack of vitality. This is the undeveloped comb that goes with a peaked-looking head on a poorly developed bird. It is small to medium in size, and shrivelled in appearance. The small comb that still appears to be fully developed is the ideal comb for the fowls of the practical poultryman; and if he breeds for such combs on his fowls and for general hardiness, he will soon have stock of which both males and females are adapted to the cold house in practice.

I have gone thus at length into this matter of size of comb, because the fact that in a cold house in this climate the temperature will go lower than is safe for most large-combed males is the one serious objection to cold houses. The other objections cannot be maintained against a test, but the cold house is not a house for a male with an easily frosted comb.

The characteristic feature of the cold, thoroughly ventilated poultry house is not so much in the method of construction as in operation. By opening doors and windows, any house can be made a cold poultry house. A good many houses built for warmth are now being used as cold houses. If the owners had to build over again, they would build less expensively; for there is no need of making special efforts to have a building very warm, when the windows are to be always open.

The cold poultry house may be of almost any design or style desired, except that ventilation should be from the front of the house and the roosts at the rear; for the philosophy of cold housing is not to expose the fowls as much as possible, but to strike the degree of protection which is sufficient for the fowls and least trouble to the keeper.

With this article I give the plans of the houses I have described. These are houses that suit me for flocks of the numbers kept in each, and houses well adapted to farm poultry keeping. The small house, if made with close-fitting joints on the back and half way forward on the sides, is warm enough for the breed I keep, or for hens of the American breeds, Plymouth Rocks, Wyandottes and Rhode Island Reds. The larger house, unless in a very sheltered location, is better to be tight everywhere but in front, for it is a higher house, and the heat from the hens makes less impression in it. In the small house the heat from a dozen large hens has a very perceptible effect on the temperature, even in zero weather.

In conclusion, let me briefly enumerate the advantages of cold houses: —

1. Economy of construction.
2. Economy of time and relief from close attention to ventilation.
3. Healthier fowls.

The foregoing are the positive advantages. As to results, we may say: —

1. That, as a rule, the production of eggs will not be as good as in warm houses that are carefully operated, but will be better than in warm houses as commonly operated.
2. That whether the difference in egg production in a warm house can be made enough greater to pay for the better attention and the greater risks of disease as a result of any little slip in the system, is a question for each individual to determine for himself. Most farmers would determine in favor of the cold house, because it leaves them more free to look after other work.

A Final Caution.

The cold house, though it has advantages, is but a part of a system. I have made the point that the kind of house is not a matter of prime importance; that the essential things in the production of winter eggs were: —

1. To have pullets and hens ready to lay at the beginning of winter.
2. To feed them well.

The argument for the cold house rests on the proposition that uniformity of temperature and dryness in the house are the most favorable conditions for health and egg production, and that these are more surely secured by most people in cold houses than in warm ones.

The cold house is simply a condition for the hens, and a convenience for the poultry keeper.

SOME PRACTICAL PHASES OF POULTRY FEEDING.[1]

BY JOHN H. ROBINSON, EDITOR OF "FARM-POULTRY," BOSTON, MASS.

It is an almost universal human habit to regard every result as brought about by a special cause, and in a single way. Most of us grow out of this superficial view in regard to things to which we have to give some thought; but it seems to require a decided effort to keep out of it in dealing with new matters or things which we do mechanically, as we were taught to do them, or have always seen them done. When we engage in something new, or seek to equal the accomplishments of those who have surpassed us in any way, we are apt to look for a key to success, or the secret of success, — for some one thing which is at the same time essential to and a guarantee of success. And when we have found out one thing that seems to be effective for the result we seek to accomplish, we are apt to be satisfied and to look no farther for causes, unless experience (as it often does) soon indicates that there must be other points to consider.

In poultry culture such matters as the merits of breeds, of methods of feeding, of systems of housing, etc., are commonly discussed as if each were of utmost importance. To himself or to others a poultryman propounds such general questions as "Is breed of more importance than feed?" "What method of feeding will give best results in egg production?" "How many square feet floor space must be allowed per hen to keep hens healthy?" "How many hens to a male to insure fertile eggs and vigorous chicks?" and so on through an almost inexhaustible list. Authorities and experts devote much time and space, and sometimes a little temper, to arguments intended to prove favorite breeds, methods or features of prime importance and indispensable;

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[1] Agriculture of Massachusetts, 1906.

while those who are looking for the truth are at the same time confused by all this disagreement, and more confirmed in the idea that success depends on the discovery of some secret, or the adoption of some special method. Men with commercial or ambitious ends to serve take advantage of the general unsettled state of opinion to exploit, and sell at a premium, their special brands of goods, or to get reputation and credit for their pet ideas. I mention this not to find fault with them. Such things may be done legitimately and honestly; but, in order that we may properly discount statements from such sources, we must know what the conditions are, and allow for personal bias and interest.

In no feature of poultry culture is there so great confusion of ideas at present as in the problems of feeding. Poultry keepers were just beginning to get well out of the mists which had been spread over the whole subject by the advocates of scientifically balanced rations, when their ideas were unsettled anew by the exploitation of "dry feeding," and the projection of a new set of ideas into every discussion of the question of feeding. I sometimes think that perhaps the unsettled state of general knowledge and practice in the matter of feeding is as much to blame as anything else for the poor results in laying and hatching which have been so general in the last four years; but that is a point difficult to prove, and getting its strongest confirmation by analogy from the fact that when the individual poultryman is in such uncertainty on any point, his average results in matters on which it has any considerable influence are likely to be unsatisfactory.

A poultry keeper who is interested in getting better results from his poultry, who is interested in what others are doing, who is always looking for improvement, could not fail to be interested in all these various ideas about, and theories of, feeding, even if he could avoid learning of them, which is practically impossible for such a man. And, learning of these ideas and theories, few can escape being influenced by them. They may not appeal strongly to one with whom poultry affairs are progressing satisfactorily; but as soon as there is occasion for dissatisfaction, as soon as things begin to go wrong, and he can assign no satisfactory reason for it, the poultryman finds himself beginning to ask what there is in this or the other idea or theory for which some claim so much.

In every case, even in those in which there are absurd developments of the foundation ideas or facts, there is a basis of truth and reasonableness upon which to build. The difficulty is not with ideas that are all wrong and theories that are all false, but with those that offer good ideas and substantial facts so mixed with error or so distorted in development and presentation that in the forms in which they are finally set before the public they are of doubtful value, or perhaps positively detrimental.

Thus, in regard to the theory of balanced rations: it is an unquestionable fact that fowls need a variety of food; that they cannot, except for comparatively short periods, be kept productive and thrifty on a diet lacking in variety; but there is a great gulf between that fact and the extreme developments of the "balanced ration" fad. Thus, also, it is an unquestionable fact that mashes, as many poultry keepers make and feed them, are injurious to fowls; but there are differences in mashes, differences in fowls and differences in people. Thus, again, it is certain that many people have injured their fowls by feeding too much corn, or feeding it too carelessly; but again it is true that many others feed corn to advantage. The fault in most exploitations of foods and methods is in claiming too much for them; and in most condemnations of foods and methods, condemning their use when it is the abuse of them that should be avoided.

The more the question of the feeding of poultry is studied, and the more carefully one investigates the results of different methods and follows equal results back along very dissimilar lines of feeding, the more will he be impressed with two facts: —

First, that equally good results are obtained by many different methods.

Second, that the same method does not invariably give the same results.

The logical conclusions from these facts are, that there are many equally good methods of feeding, and that there are other factors to be considered besides quantity, quality and composition of the food.

These conclusions need cause no confusion of mind, and probably would not, if it were not for that prevalent habit to which allusion has been made, — of seeking always to establish a peculiar relation between every result and some less single agency or cause. That habit makes people avoid the logical conclusions altogether, seek to find some other solution of their difficulty; and in the mental confusion which follows they imagine that the matter of feeding poultry is complicated and difficult, when the truth is that it is simple and easy if the poultry keeper will only let it be so, and if he will also maintain as near an approach to natural conditions as is necessary for the proper exercise of natural functions.

It is a matter of common observation among poultrymen that chicks hatched and reared by the natural method will usually thrive on almost any kind of feeding; while those hatched and reared artificially will often fail to thrive on the same ration that naturally hatched and reared chicks on the same premises are given with wholly satisfactory results. Why is it? It is because in the case of the artificially hatched and reared chick the diet so often has to be adapted to some unnatural and abnormal condition. This is usually a condition resulting from improper temperature or lack of ventilation, either in the incubator or in the brooder.

To illustrate: we know that it is possible for an incubator to make a good hatch, and yet the chickens — through some undiscovered wrong condition during incubation — be incapable of living. The most marked instance of this kind of which I know was called to my attention some years ago by an exceptionally expert, careful and intelligent poultryman. From two large machines set at the same time he had taken remarkably good hatches, — about three hundred from each machine. The eggs were the same, one lot of eggs having been divided between the two machines. The conditions after the chicks were put in the brooder house were the same. They were all fed alike. When I saw them, between two and three months after the hatch, hardly a chick had been lost from one lot, while of the other hardly a chick remained. That the difference was due to something which happened during incubation was plain, but what that was it was impossible to say.

It has also often happened that when a lot of chicks from the same incubator are placed in different brooders those in one brooder will thrive, while those in another will not, — all conditions but brooding conditions being the same. The facts plainly indicate something wrong in one brooder. What is wrong it may not be easy to discover.

The bearing of such facts on the question of feeding is this: without being so bad as to cause heavy losses of chicks, brooder or incubator conditions may be such that the chicks are not in perfect condition. Thus, as a result of wrong temperature in either machine there may be a slight catarrhal condition of the digestive organs. To chicks in this condition foods which cause no discomfort at all to perfectly healthy chicks may be at first slightly, and at last highly, irritating, causing serious, if not fatal, digestive disorders. There may be the same difference between chicks hatched and reared by natural methods; but opportunities for errors in hatching and brooding are much less frequent, for hens cannot vary in temperature as incubators and brooders may, and do, — especially in the hands of inexperienced operators.

Now, when we find that an article of food or a system of feeding which, under natural conditions, gives generally satisfactory results, sometimes — either under natural or artificial conditions — does not give satisfactory results, we should know that the fault is not in the food, but in something else; and that, while we may avoid ill consequences by a diet which will counteract the trouble, we do not remedy it. If we think the fault was in the feeding, we may be entirely wrong; and, if so, as long as we continue on the supposition that the feeding was wrong, we are not likely to get at the real trouble.

When a poultry keeper finds that he cannot use a ration which in the experience of others has been shown to be a good ration, he may be sure that there is something else wrong in his flock or his methods. Fowls that are healthy and rugged can use any ration that furnishes approximately what they require, and may do well on such a ration for a long time, though it may be in some respects objectionable, and neither the best nor the most economical ration. But as soon as a poultryman finds that it is only by keeping strictly to a certain ration or system that he can command success, and that variations from it are almost immediately followed by bad results either in health, growth or egg production, he ought not to conclude that his system was so absolutely perfect or his ration so exactly balanced that any variation from it was at once seen to be wrong. He ought rather to conclude that, if his fowls were so dependent upon an exact ration or system, they were so either because so constitutionally weak that, like dyspeptics, they required a diet adapted to their weaknesses, or that there were wrong conditions which something in his ration or system constantly operated to counteract.

So the rational way to look at the matter is that, if fowls or chicks can eat and thrive on practically anything offered them in the line of staple poultry foods, without regard to careful balancing of ingredients of which they are composed, the stock is healthy and sound, and the general conditions conducive to health; but if good results are secured only by careful dieting and rigid adherence to a "balanced ration," there is weakness or error somewhere that is as likely to cause trouble when disturbed or aggravated by other means as when affected by changes in diet. Healthy poultry, like healthy people, are not "fussy" about their eating, but eat with relish all ordinary articles of food, and are not over-particular about the relative proportions of different kinds of food; for the normal digestive system easily takes care of any ordinary surplus without discomfort to the fowl, and often with decided benefit to it.

If the normal, healthy fowl or chick thrives as well on one ordinary good ration as on another (and that it does so is readily demonstrated to any one who compares results fairly), claims of general superiority for any special article of food or mixture of foods are clearly mistaken. The practical significance of this fact is that, understanding it, the poultry keeper can use special foods or systems of feeding to correct some wrong conditions, and can also use whatever available food or system of feeding is most economical or most convenient.

While, as I have said, dependence upon a certain food or system indicates something wrong outside of the feeding, if we have conditions that make us dependent on some food or system, we must continue to use it until by locating the trouble and correcting it we can become independent, and use any foods and methods we choose. I had at one time some stock that had a constitutional tendency to chronic looseness of the bowels. To check and eradicate this I did two things: I began by feeding both the breeding stock and the chicks on dry feed, and by selecting for breeding purposes each year the fowls which showed the least inclination to bowel trouble. In a very few years I had the stock entirely free from the trouble, even when fed the same ration on which the original stock had been always loose.

But it is in such matters as economy and convenience in feeding that the knowledge of the general equality of results of foods and feeding methods for healthy stock is of greatest benefit to those who have it, and should be of most benefit to farmers and gardeners who have at different seasons of the year so many different things which may be used for poultry food, and who often find the method of feeding which suits them at one season of the year inconvenient at another.

On most farms there are available during the fall, winter and sometimes well into the spring waste vegetables of various kinds, which, with a little special preparation, are made more palatable to the fowls than if fed in their raw state. Small potatoes, beets, turnips and other vegetables, cooked and made the basis of a mash of meal and shorts, can be used to good advantage and with less waste in that way than in any other. It takes a little time to prepare them. Whether it is best to use that time in that way must depend on how profitably it would otherwise be employed, and the value of the food thus utilized.

From the time farm or farm garden products begin to be marketed, there is on most farms considerable waste which may be fed to poultry or other stock. Sometimes the articles and the amounts of them available for poultry are such that it is not only unnecessary but would be detrimental to the fowls to feed them freely, and also to feed a wet mash. At this season of the year, too, there is on most farms other work more pressing and more profitable than keeping up through the summer the system of feeding followed during the winter. So, with an abundance of green food either supplied to the poultry in their yards or ranges or fed from the field or garden, there is no need of feeding ground grains, either wet or dry, and the work of feeding the poultry may be reduced to occupy but a very short time. Possibly the gross results may not be as good when the attention to feeding is reduced to the minimum. I think the general experience of poultry keepers shows that the best gross results are obtained when fowls get a great deal of attention, — not fussy or annoying attention, but judicious attention. It is so with all animals. By giving them a considerable variety of food, prepared in a variety of ways, we tempt the appetite to take the largest possible quantities of food, we avoid in no small degree the dangers of overeating of a single article, and we get in poultry better growth and greater egg production; but whether we get enough better results to pay for the extra trouble and food required is something to determine each time the question arises, in accordance with circumstances at that particular time and place.

Some poultry keepers on farms, or elsewhere, are so situated that it is desirable to reduce the work of feeding the fowls as much as possible at all seasons of the year. To such the dry feeding methods so much advocated of late years often present the most satisfactory solution of the feeding problem. It has become customary to describe any system of feeding which omits the wet mash as "dry feeding." The advocates of dry feeding generally have made sweeping condemnation of wet mashes, and have charged against their use all the ills discoverable in any flock to which a wet mash happens to have been fed. As would be expected, they have also gone to the extreme in claiming all sorts of beneficial results from dry feeding. I think that any fair general consideration of the facts will show the same diversities in results that are found when we attempt to make out a case for any method by attributing to it alone results in cases in which it is a factor. It is impossible to prove the superiority of a method or a breed by a comparison of individual instances. The surest test is the test of time and general use. That test operates slowly, and leaves us always with a measure of uncertainty as to the final result; but in compensation it also gives us — if we heed it — caution in accepting results of new methods prematurely.

The situation with regard to the dry feeding of poultry to-day is that, without approaching a full demonstration of their claims for that method, the advocates of dry feeding have materially benefited many who were not successful in the use of the mash system, and have emphasized a principle, which may well be termed a fundamental principle in feeding, that had fallen into general disuse among those trying to feed poultry for best results, — that is, the very elementary principle that to lay well or grow well, fowls must be well fed.

A prominent feature of the teaching of the "balanced ration" advocates was the necessity of avoiding over-feeding. So insistently were the evils of over-feeding proclaimed, and so much were poultrymen impressed by this preaching, that among those trying to feed right over-feeding had become extremely rare, while it was a common thing to find poultrymen feeding rations just short enough of what they should be to give good egg yields. So general have I found this, that, beginning some years ago, in every case where a correspondent wrote asking what was the matter with his hens, that would not lay, in which I could find no special cause for failure, I have advised to feed a little more, and it is quite surprising how often this happens to give the results wanted.

Now, the dry feeding system, as usually advocated and practised, keeps food before the fowls all the time. They need never be hungry. And in nearly all cases where dry feeding has given better results than a system including a wet mash, and the wet mash used was of good consistency, I think it will be found that the dry feeding system owes its apparent superiority to the simple fact that by it the hens get enough to eat.

And that, as a matter of fact, is the prime factor in successful feeding. There are other points to consider. Hens must have exercise, and there must be some variety in their food, but above all, if we wish good development and good egg production, there must be abundance of food. And, from what I have seen of results of many different methods of feeding, I would say give abundance with variety; but, if there is a choice between variety without abundance and abundance without variety, the latter is to be preferred. In abundance of food without variety we may get results and wear the fowl out quickly; in the other way we are more likely to keep a fowl just short of profitable performance.

Some of the best results in winter egg production I have ever seen have been obtained from flocks which were not handled in the best way. There were faults in the management during the winter which might have been avoided; but the poultrymen made their fowls pay better, in spite of these faults, than most others did without them, and they did this simply by working on the principle of giving their fowls all they could eat. I went one day to visit a poultry farmer who had the reputation of always getting good egg yields in winter. What I saw in the nests in his houses in the dead of winter seemed to justify his reputation. I asked him to what he attributed his success. He replied, " The only difference I can see between my poultry keeping and that of those poultrymen about here who complain that they can't get eggs is that I keep food before my hens all the time." His hens were inclined to get too fat toward the end of winter, and fall off in egg production; but he made more than he lost by heavy feeding.

A Maine farmer whose farm I visited several years ago had about five hundred hens, and kept cracked corn before them all the time. They had the range of the farm in summer, but were not out of the houses much in winter. He was said to be the only farmer in that neighborhood who always had eggs to ship to Boston in December and January.

I once asked one of the most successful poultry keepers of my acquaintance, a man who combines poultry keeping and general farming, what he thought was the principal thing in winter egg production. He replied that it had been his observation that if pullets were ready to begin laying about the beginning of winter they would begin and lay right through, provided they got enough to eat; and that he could not see that it made much difference — within the range of usual poultry foods — how or what they were fed; the all-important thing was to give them all they could eat. Of course he did not mean that the kind and quality of food made no difference. In making such a statement, it is understood that the reference is to rations such as good poultrymen would use.

Good feeding sometimes consists more in using to advantage waste products and cheap products than in getting large results. To do this the poultry keeper must be in a measure independent of systems, — not bound either by wrong conditions, or weak stock, or faults in his methods, to follow carefully a delicately balanced system.

HATCHING AND REARING CHICKS BY NATURAL METHODS ON THE FARM.[1]

BY JOHN H. ROBINSON, EDITOR OF "FARM-POULTRY," BOSTON, MASS.

A leading manufacturer of incubators is my authority for the statement that there are in the United States and Canada about one hundred and thirty concerns manufacturing incubators and brooders. Many of these are small establishments, whose separate output is comparatively insignificant, but the aggregate output of these small factories must be very large, and there must be fully two score of concerns manufacturing on a large scale, the largest turning out hundreds of incubators and brooders daily. Though the total production of these machines for the hatching and brooding of chicks is greater now than ever before, it has for years been large, and when we consider that a well-made incubator ought to last for a good many years, it would seem that the increasing number of incubators and brooders sold must indicate a general substitution of artificial for natural methods of hatching and rearing chicks, and the early advent of the era to which some enthusiasts in artificial methods look forward, when the hen will have nothing to do but produce eggs.

The incubators and brooders sold do not necessarily represent hens put out of commission as mothers. To just what extent they actually displace hens it would be impossible to determine, but where they are most used their service is either in supplementing natural methods or in lines which could not be developed on a large scale by such methods. The incubators and brooders sold also go very largely into the hands of beginners in poultry keeping, who, without any actual knowledge of methods upon which to base a preference, take the artificial method as presumably the latest, most scientific and most up to date. Then there are always poultry keepers expert in natural methods who for various reasons want to try the other system, while the enormous volume of advertising artificial methods keeps constantly before the public, often in grossly exaggerated statements, the advantages of such methods. So it might well be said that the great output of incubators and brooders goes to meet fictitious as well as real demands. It may also well be said that by different manufacturers these demands are met with machines of very different quality and possibilities, and as one result of this state of affairs an enormous proportion of the incubators and brooders sold each season does not go into permanent, practical use.

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[1] Agriculture of Massachusetts, 1907.

Thousands and thousands of the cheaper machines will hatch well only while new, and under the most favorable circumstances. Thousands of poultry keepers who buy good machines never learn to run them satisfactorily. They may continue to use them experimentally for some years, but in the end they go back to natural methods as easier and better for them. And the question which is the better method in the end comes to a question of circumstances and of the aptitudes of individuals. Some people can do so much better with artificial methods that they prefer them under any circumstances. Some can use either method successfully. Others get their best results by natural methods. So natural methods continue to be used and used very extensively, and, further, the competition of methods has without doubt served to give a better general understanding of the weak points of natural methods and the best ways of treating them.

However much he may in his innocence have been deluded by the representations of those interested in selling the goods, the operator of incubators and brooders soon finds that these mechanical contrivances are not self-operating. He has to tend them constantly and carefully, and give a great deal of thought to what at first seemed the trivial matter of putting into practice the few simple directions for operating which accompanied the machine. He learns in time (if he succeeds) that to have his machines work well he must, in working with them, be methodical and regular, and, as far as possible, furnish conditions of operation which are favorable.

Favorable conditions, regularity and system seem necessary and fitting parts of a method in which mechanical contrivances have an important part, but all do not readily see their importance in methods when results do not depend upon them absolutely. So it happens that in the hatching and rearing of chicks by natural methods there is too often nothing resembling a system, and no well-advised effort to get all the benefits of natural agencies while avoiding the losses which are apt to occur when natural agents are not well ordered.

The farm furnishes as near an approach to purely natural conditions for the production of poultry as we can have for domesticated fowls, yet it is a most exceptional farm that offers conditions which admit of leaving the poultry — particularly the young poultry — to itself. In a state of nature the tendency is for such creatures as fowls to maintain themselves in about the same numbers on the same area year after year. This means that the great majority of the young produced must succumb to their natural enemies or to the rigors of natural conditions before reaching maturity. Now, though the domestic hen may be far more prolific of eggs than her wild counterpart, she is also an expense to her owner, and his profit upon her is measured not by the number of eggs she may lay but by the difference between the value of her produce and the cost of her keep. In the matter of eggs, it would be no great advantage to the owner of hens that they were great layers if their eggs were lost or destroyed. So it is usual for poultry keepers on farms either to make provisions for the poultry which compel the hens to lay in the places provided for them, or to keep close watch on all places within the range of the flock where hens might lay, and collect all eggs while in good condition. There may be a percentage of loss between the laying and collecting of the eggs, but it is not often a very large one.

In the hatching and rearing of chicks come the heaviest losses of most poultry keepers on farms, and to a very great extent these losses are not necessary and could easily be avoided. To make separate special provision for the losses from all possible different sources is not practicable. The practical and effective way to avoid losses and make the most of natural facilities for hatching and growing chicks is to systematize the work, and make the same sort of provision for getting full results from natural methods as is usual when artificial methods are used.

The incubator operator provides for his machines a place where, to the best of his judgment, conditions are favorable. The poultryman hatching with hens too often provides no suitable place, or sets hens any way and in any place. The brooder operator provides very carefully for his chicks and for his own convenience in caring for them, but when hens do the brooding, there is apt to be too great variety in accommodations to admit of uniformity in treatment, and, while that may mean some saving in cost of equipment, it usually means also an increased cost of labor, and whether it is labor he does himself or labor he pays for, the increased cost of labor comes out of the poultry keeper, either in the form of harder work or as diminished product and profit.

Provide for the setting hens exclusive quarters, and for the hens with chicks coops of substantially the same size and type, and a piece of land of such extent and character that the chicks have all the advantage of range and freedom without being so much scattered that the work of looking after them four or five times daily is too laborious.

If this is done, and a reasonable amount of attention given the chicks up to the weaning age, losses up to that point should be small, and the stock on hand at that stage much better developed than when the work is not so thoroughly done.

When any considerable number of chicks is to be hatched by hens it is advisable to set as many hens as possible at the same time, and preferable to have a certain day of the week for setting hens, and set none at other times. This simple little point of practice introduces at once an element of regularity in the work which would have a marked influence all through, even if no other effort to secure regularity were made.

Make the nests in banks or tiers, built up like shelving in a store, or perhaps more graphically described as resembling a sectional bookcase. The nests need no back, for they are placed against the wall. The fronts should have covers of slats, or of a board just wide enough to leave space for air above and below it. Each cover should be the length of a section, opening and closing all nests in one section together. The covers should be hinged at the bottom (leather hinges will do), because they must be fastened when closed, but if hinged at the top, they must be fastened to keep them open as well. Besides this, the cover front hinged at the bottom may be used as a running board in front of the nests if so desired. For ordinary hens nests should be twelve inches square, inside measurement. For nesting material use short, fine hay or broken straw, and shape the nest well with the hand. If the nest is not shaped before the eggs are put in it, and the material well pressed down, eggs are likely to be broken during the first days of incubation.

Set only hens that are evidently in good health, and give the preference to those in fair flesh. Set no hen that is not easily handled after dark or that will fly from the nest if approached by daylight. To have hens that are healthy, quiet and easily handled means freedom from a large portion of the usual losses in the early weeks of the chick's life, as well as during incubation.

Select for incubation, eggs of uniform size and good form and color. If for any reason it is desired to set some eggs larger or smaller than the average, sort the eggs and give the special sizes to separate hens. The rule of thirteen eggs to a hen is a good one to follow if all nests are twelve inches by twelve inches. Some hens can cover more, but, for a reason which will shortly appear, the number of eggs should be adapted to the smallest hens in the lot. If nests are of different sizes the largest nests and hens may have more eggs, though fifteen is as large a number as it is advisable to give any hen.

Have the hens come off for food and water daily. If a large number of hens are set at the same time — all the apartment will contain — they may all be let off together and the nests closed while they eat, drink and dust themselves. If the floor is of earth, without too much broken droppings in it, no special dusting box need be provided. The food should be corn or other hard grain, corn preferred, and whole corn used rather than cracked corn. For the first few days the hens should be watched closely, to prevent fighting. After they become used to the place and to each other, the attendant may let them out, close the nests, and leave them until time to return them to the nests, — twenty minutes to half an hour. In returning hens to the nest make no effort to have the hens go back to the same nests. On the contrary, if any are noticed which persistently take a certain nest return them to another. By doing this all eggs have the same treatment. A hen that, if on the same eggs continuously for three weeks, would make a poor hatch, is never on one nest long enough to specially affect the eggs in it, and the results are better average hatches and a larger total hatch.

Dust the hens with an insect powder when setting them, again about the tenth day, and again about the nineteenth day, just before the eggs begin to pip. After the hens return to the nests remove the droppings before they are broken into the floor, and the place will be free from the peculiarly offensive odor too common where hens are setting.

Test the eggs the seventh day and again the fourteenth day. A metal chimney for testing, which may be used with a common lamp, may be purchased at any poultry supply house. An infertile egg remains clear throughout the period of incubation. A fertile egg at the seventh day shows quite opaque, with the air cell at the larger end sharply defined and in the same position with reference to the shell as the egg is turned before the light. If the germ is dead, but the egg not yet decomposed, the dead germ may show as a dark or bloody spot in the opaque contents of the egg. If the egg is rotten, the line of the air cell will remain horizontal as the egg is turned before the light.

Unless fertility is exceptionally good, enough eggs will be taken out at this test to release one or two hens, the eggs from their nests being used to fill others, and they either reset with the next lot, or returned to the laying pens. If the eggs were fresh when set there will rarely be rotten eggs to take out at the first test. The test on the fourteenth day discovers most eggs that will not have full-formed chickens at the end of the period of incubation, and it is important that these should be removed, for the rotten egg is the egg that breaks, and broken eggs not only make a nasty mess to clean up, but injure the chicks in the eggs which are soiled, and thus reduce the prospects of a hatch. Unless an unusual number of eggs should be taken out at the second test, it is as well not to double up again.

After the eggs begin to pip keep the hens on the nests until the hatch is completed. This will usually be in thirty-six hours. Look into the nests enough to see that things are progressing right, to clear away shells as they accumulate and to see that no chick is smothered by an empty shell capping the egg containing it. If a hen is so restless that she tramples her chicks, exchange her for a quieter one from a lot set later.

When the chicks are all dry remove them from the nests to coops previously made ready for them, giving each hen from twelve to twenty chicks, according to the season. Select as mothers the hens that are in the best condition and most thrifty looking.

Up to this point the farm has offered no special advantages over what would exist anywhere where there was a vacant pen in the poultry house, or a convenient shed or outbuilding that could be used for the sitters. From this point the farm has great advantages, and they should be fully utilized. Even a farm too small to give fowls free range without their trespassing on neighbors has advantages far surpassing those of the town poultryman, who must make up for lack of natural advantages by special care to provide variety in food, to maintain a healthful cleanliness and to guard against the evils incident to the crowding of chicks on limited areas.

What farm is so small that, if the matter were systematically provided for, it could not furnish new ground, on which the grass was well established, each year for the little chicks? With hay at the prices which prevail in Massachusetts it seems sometimes almost a crime to put chicks on mowing land before a crop has been taken from it, but if there is no part of the pasture or orchard available for small chicks, and convenient to the house, it will certainly pay the grower of chickens to give up to the smallest of them a piece of grass land as large as they need. That would be a piece as small as they could keep the grass down on without killing it out. In an ordinary season this would be a piece as large as required to place the coops about two rods apart each way and have a margin about two rods wide outside the coops all around the plot. In a wet season, or where the growth was rank, the coops should be closer together; under the opposite conditions, farther apart. The loss of hay from the land given up to the chicks would be at least in part made up by the heavier crop from the piece next year, for the droppings of the chicks will distribute quite evenly over it a high-grade fertilizer, while whatever waste of food there may be is not lost, the waste going to enrich the land.

Supposing a piece of mowing land on which the grass is well up is to be devoted to the little chicks. It should be mowed before they are placed on it, because if left long the chicks would get too wet running through it when the dew is on it in the morning and on wet days; and so it would be necessary to keep them shut in the coops more than is desirable. In respect to chicks running in wet grass it may be said that rugged chicks are not injured by it in ordinary weather, when the sun and air dry them quickly, and when the hen, confined to the coop, keeps dry, and if wet and cold they can go to her and be quickly warmed and dried; but weakly chicks do not stand much wetting, nor can any chicks stand much wetting if they cannot quickly dry themselves after it. Let chicks run when conditions are favorable, at other times keep them confined. When there is so much unfavorable weather that chicks would be shut in too much if this rule were followed, keep coops in the same places long enough to keep the grass short around them, and keep a dish of dry feed — shorts and meal mixed dry will answer — beside the coop, that the chicks may remain near it.

If the plot given to the chicks is convenient to the house the chicks will nearly always get better attention than if it is at a distance, because then the care of the chicks will interfere less with other work. On some farms, where large numbers of chicks are grown, the men do the morning feeding, watering, cleaning and heavier work, and close the coops at night, the women feeding them at intervals through the day. When it is too inconvenient to make several feedings daily, food may be kept by the chicks, but that practice is not to be recommended unless they have a much larger range than indicated by the arrangement of coops suggested.

Ordinarily, coops placed in that way should be moved their own width or a little more daily, until the original position of the next coop in line is reached, then backward or forward the length of the coop, and back toward the original position. Moving this way is done when the coops are opened or closed, and the time taken is scarcely noticed.

The best results in growth and development will be obtained by alternating hard and soft foods. Give a mash in the morning, shorts and meal in equal parts, with a little beef scraps added; a feed of grain, wheat or fine cracked corn about 9 o'clock; mash again at noon; wheat or corn about 4 o'clock, and mash just before dusk. The grain foods may be scattered at the time the mashes preceding them are fed, if conditions are such that the chicks do not soil the grain too much before they eat it. When grain is soiled by their feet, even on quite clean ground or grass, it becomes in a degree poisonous and dangerous to the chicks, just as filthy water is.

To many the idea of feeding whole wheat to little chicks may be novel and seem absurd, but the writer has done it for the last fifteen years, and grown as good chicks and lost as few as when only very fine grain was given early. Chicks start slower on a diet in part of hard grain, but develop better digestive capacity, and later will stand heavier feeding and develop better than those kept too long on soft food. To keep chicks free from lice dust them with insect powder when taken from the nests, then once a week for three or four weeks.

By the time the chicks have outgrown their first piece of ground there should be other places on the farm to which they could be transferred. For the weaned chicks, coops about three feet by six feet, easily moved about, called

" roosting coops " by poultrymen, are as good as anything. These may be placed on mowing land after the first crop of grass is off, or at the edge of a corn field where the corn is well started, or a piece of asparagus on which cutting has ceased, or anywhere that the chicks can have room without damaging anything. In general, it may be said that when they can do no damage they always do good. The one most important point in growing chicks is to give them plenty of land room. Many poultry keepers are careful to keep coops scrupulously clean, but are rather indifferent about soiled and contaminated ground. This is not strange, for the great advantage of a good range is not often apparent except to those who compare the development of chicks on land that looks clean, though it shows the wear of chickens on it, and on land which furnishes more liberal range. After fowls are grown they will stand close confinement, but growing chicks should have room, and if limited for room must have special care to compensate.

The feeding of the chicks after weaning should continue along the line on which they were started. Unless the land furnishes an unusual amount of food, it will pay to keep up the four or five feeds a day, until they begin to be indifferent at some of the feedings. Then omit one feed, — the soft feed at noon. When this point is reached the chickens will get along very well with no attention between the time the hard grain is given them in the morning and the time for feeding it in the evening. At both feedings it should be well scattered, and the evening or afternoon feeding should be several hours before sundown to give them ample time to eat a feed of the scattered grain. Then just before dusk give them all the mash they will eat. They will eat quite a hearty meal of this after they have fed to a surfeit on grain, and will make growth proportionate to the quantity of food eaten.

The methods I have outlined call for nothing expensive in the way of appliances, nor do they call for a great deal of work. There is nothing in the equipment suggested but what any handy farmer can make himself, often from waste lumber or from material purchased at a trifling cost. The prevailing idea is to have things suitable for the purpose to which they are put and convenient for the attendant. This means uniformity in equipment and system in care. By observing these two points, and by studying to keep the chicks as much as possible on land under cultivation or in grass, the farmer can at the same time avoid heavy losses of chicks and greatly increase the poultry-carrying capacity of his farm.

ARTIFICIAL HATCHING AND REARING OF CHICKENS, AS APPLIED TO "SOUTH SHORE ROASTERS."[1]

BY HENRY D. SMITH, ROCKLAND, MASS.

The hatching and raising of chickens artificially has been practised for ages, but the last decade has been marked with the greatest strides, as is shown by the vast number of incubators and brooders that are being made daily by the various manufacturers, all of which are being sold and used, which means that the poultry industry is still growing.

The question is often asked, "With all of this increase in the production of poultry products, is not the time near at hand when the poultry business will be overdone?" The reply is "*No,* not as long as the demand increases as fast as the supply." And to-day Massachusetts is only producing about one-half of the poultry products that she is consuming, and again, while the price for spring roasters has not been any higher for the last two years than formerly, it has remained high for a longer time, which is just as good if not better for the poultryman.

To illustrate the importance of artificial methods in the hatching and rearing of chickens, just imagine our going back to the old hen for an incubator and a brooder! We might as well go back to the ox team for our transportation, and discard the steam and electric cars as well as the automobile and the flying machine, which is almost here.

With all of the incubators mentioned above going broadcast all over the country, into the hands of the novice as well as the expert, the question very naturally comes up, "Just what is the proper method for operating an incubator to get the best possible results?" In considering this question we must assume that the eggs are from good, strong, vigorous stock, which means not only stock from good parents, but those that are fed properly and comfortably housed. Almost any good variety of grains thrown in the litter of from four to six inches deep every morning (three parts of corn, one part each of wheat, oats and barley, makes a very good mixture), with a so-called dry mash, composed of equal parts of ground oats, middlings, Indian meal and beef scraps, until the hens get to laying well, then reduce the scraps to one-half of a part, makes a very good feed. The dry mash is practically before them all of the time in troughs or hoppers, and of course plenty of good water, shells, charcoal and plenty of green stuff in some form, — clover, alfalfa, rowen hay, cabbages, mangels, beets, or any of the many things that are the most available about the farm. Then the eggs should be gathered at least once a day, and in cold weather often enough so that they do not get chilled, every egg being marked with the number of the pen in which it was laid, so that when there are sufficient eggs to set a machine, a record can be made of how many eggs came from each pen.

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[1] Massachusetts Crop Report, August, 1908

In starting the incubator, the manufacturers' directions are sufficient, and their instructions for operating are as good as can be given in a general way for all parties and all conditions; but right here is where the difficulty, the mystery, and all of the varied opinions and controversies begin. If it were possible to have the very same conditions in every one's incubator room, the same instructions would apply to all; but until then, no rigid, fixed, arbitrary rule can produce the best results. To illustrate the different conditions that it is possible to obtain, divide the humidity into the following classes, — very wet, wet, damp, normal, dry, and very dry; then divide the ventilation into very poor, poor, fair, good, and very good; then make as many divisions of the temperature, from freezing to 85° or 90° above; now figure up the number of combinations that there are in all of the above features, and see what the little, insignificant embryo chick must contend with before the operator begins to manipulate the machine at all.

In starting an incubator, the best thing to do — and it is not difficult — is to follow the manufacturers' directions, and then by careful experiments, and records of them correctly kept, ascertain just how the best results can be obtained under one's own conditions. Now this seems to leave the party seeking information right where he began, but it does not if he thoroughly "digests" it, or grasps the writer's idea. Suppose a party buys his first incubator, and before starting it he goes to half a dozen different poultrymen, all equally successful, and finds out just how each one is running his machines; the chances are more than even that there will not be two of them that are doing exactly alike, and the party finds himself more bewildered than ever, when as a matter of fact they have all been honest with him, and are doing the very best that can be done under *their conditions.* For instance, one may run his as high as 104°, and perhaps is "airing" or "cooling" the eggs a great deal; where another may run his from 102½° to 103°, and is not airing his eggs at all; again, one may not supply any moisture at all, where another will be sprinkling them twice a day; and another has a wet sponge or some water pans in the incubator, or a wet blotting paper around the heater, and another will wet the floor down *wet;* then there are all kinds of ways of ventilating both the incubator and the room, so that I will have to reiterate, as above, that there is no one rule that will apply to us all.

With all of the above explanations, so that no one will be misled, I will now try to explain what my conditions are, and how I handle my incubators. The cellar is 12 feet by 26 feet, and 5 feet deep to the top of the stoning, and the roof sets right on the stone work. The floor is not cemented, as the tendency would be to make it too dry, and we intend to keep the floor good and damp all of the time. The roof is sheathed up on each side about 4½ feet on the rafters, then level across the top, thus forming an air chamber, which helps to maintain an even temperature in the room. For ventilation there is an imitation fireplace in the stone work at one end, which leads up to a wooden chimney, and there is on this same end a window 30 by 30 inches, which is always open excepting in a driving storm, or when it is so cold that the incubators cannot be kept up to the proper temperature readily; the entrance is at the other end, with a door at the top and bottom of the stairs, each door having a slide 8 by 12 inches, which is used for more ventilation, and there is a small ventilator out through the roof. There is no heat supplied other than the incubator lamps.

In this room there are eight No. 3 Standard Cyphers Incubators, holding from 380 to 400 eggs each, according to the size of the eggs, of the 1906 and 1907 patterns, having the drawers for the chicks to drop into after they are hatched, and the drop bottom; and they also have an electric light placed close to the thermometer, so that the temperature can be read easily and correctly. The temperature is then brought up to 102½° and the eggs put in, which will bring the temperature down again, but when it gets up to 102½°, which it should do in less than half a day, the ventilating holes in the bottom of the machine are opened. The lamp is filled and the char rubbed off (not trimmed) of the wick, and any black incrustation that may have accumulated on the burner scraped off every day; and if the porous brass plate around the wick tube gets fouled up, that must be taken out and thoroughly brushed off.

The eggs are not turned the first two days, but after that they are turned night and morning every day until they begin to pick the shell, excepting the days when they are tested. The heat is not allowed to get above 103° during the first week, but during the second week it will naturally rise a little, owing to the animal heat that will begin to develop in the eggs; but if it goes much above 103°, take the eggs out, or leave the door open and cool them down again. About the time they begin to pick out, if the heat goes up to 104½° or 105° of its own accord let it remain; but if it goes any higher, bring it back with the regulator, but do *not* open the door.

The chicks are not allowed to drop down into the drawers until they are nearly all hatched, as there is quite a difference in the temperature in the two places, and by keeping them up on the tray until a good part of them are thoroughly dried off and smart, then the smartest ones will come to the front, and so many of them drop down in so short a time that none of them get injured by the change of the temperature, as they keep each other warm. The door is not opened until the morning of the twenty-third day, when they are taken to the brooder, and the machine cleaned up thoroughly and set again.

Before putting the eggs in the incubator, they are all sorted out according to the number on each egg showing the breeding pen that they came from, and a record is kept of how many eggs are set from each pen, so that when they are tested, those that are thrown out can be sorted and set down in another column. The first column has the number of the pens; the second, the number of eggs from each pen; the third, the number of unfertile eggs; the fourth, the number of germs that started, but are dead or "addled" eggs on the first test; the fifth, those that are dead on the second test; the sixth, the eggs that do not hatch; then, by adding all of the eggs that are thrown out from each pen and subtracting them from the number of eggs set in column 2, we have the seventh column, which shows just what each pen of breeders is doing.

If a certain pen's eggs are not fertile, change the male bird at once, giving the first one a rest, when he may be used later on to take the place of another who is becoming exhausted. In changing the male bird, which is one-half of the flock, as far as fertility is concerned, we have done about all we can for this feature, unless it is to change again; for, although it is sometimes argued that the hen may be to blame, or her condition, it is safe to assume that a hen that is in good enough condition to lay is pretty likely to be in good enough condition to give you fertile eggs; but if the fourth, fifth and sixth columns show that too many of the fertile eggs fail to hatch from any particular pens investigate at once, and see if the flock is healthy, are properly fed and cared for in every way; but if this trouble happens with all of the pens, buy some eggs from some one who is getting good hatches, and then one can easily determine whether it is the fault of the eggs or in the process of incubation. If it is found to be in the incubating, "go for it," and find out, by a systematic plan of experiments, just which of your conditions or what you are doing is wrong. Stick to it, — that very "stick-to-it-iveness" is what has been ascribed as the secret of the writer's success.

Make the first test on the fifth or sixth day, and the unfertile eggs will be in good condition for all cooking purposes, and are worth from one-half to two-thirds the price of market eggs; there is also more room and the eggs can be turned more easily. The second test can be made about the fourteenth day, and if all the dead ones are thrown out, there will be very few if any that will be rotten and smell bad; and by carefully studying the records of both tests, one can keep in touch with just how the process is progressing.

To make a good tester, have a window that faces the sun fitted with a board having a hole in it, the same as any tester, with a piece of felt or leather around this hole, and then darken the rest of the room so that all of the light must come through the egg when placed against this hole. With this arrangement, and a bright sun, no explanation of how to test is necessary, for after one has tested a dozen eggs he can tell as well as any one what is the condition of the eggs.

Under the above conditions the airing or cooling of the eggs is not practised, except when they get too warm, the theory — and it is well borne out by experiments — being that if the room is well ventilated, so that the air is kept good and the proper temperature maintained, the embryo gets all that is needed through the natural circulation that is taking place in this kind of an incubator all the time. On the other hand, if the air is so vitiated that it feels close or "stuffy," and smells strong of the fumes of the lamps, and so that one is glad to get out after staying in there a few minutes (and many of the incubator rooms are in just this condition), and the air in the incubator cannot possibly be any better, in fact, not as good as the air in the room, it is quite likely that a reasonable amount of *airing* is beneficial, but *not* the *cooling,* unless the temperature is too hot. There is no question but that the embryo chick needs oxygen, and that being an accepted fact, it must be far better to give it good oxygen all of the time than to give it inferior oxygen, and in spasmodic doses, at that. It makes quite a difference, too, in what temperature they are aired, as well as at what stage of the process; for to air them considerably where it is not too cold, during the last week, will do no harm, and under some of the above conditions will be of benefit, but to air them during the first week is a great mistake, especially if the temperature is anything but warm.

The writer has been called many times to help poultrymen out of different kinds of trouble, such as, Why do we not get better hatches? Why do so many die in the shell? Why do they die so after we get them into the brooder? One of the most pronounced cases of the ill effects of airing and cooling was where a party began to air the eggs on the third day, where the temperature of the room was just 50° F., for fifteen minutes, and I think twice per day at that, and this in a room where the ventilation was very good and they did not need airing at all, and certainly did not need and could not stand the cooling, for out of 8 fertile eggs tested on the seventh day there was but one live germ, and out of several hatches of 30 dozen eggs each he got less than 1 dozen chicks per hatch. Through my advice he stopped the airing scheme, and out of the next hatch he got 108 chicks from 180 eggs, and 43 from the other 180 eggs, and from this experiment he also learned that there was trouble in the flocks that the 43 chicks came from. Now, there is another who has derived more or less benefit since he began to air the eggs, and a comparison of the conditions will easily show why. In the first place, the ventilation is not near as good as that of the first party, and then if the room is too cold he has a little stove to warm it up. This is all now on the cooling practice, but when we come to the brooding and rearing of the chicks I will refer to it again.

To illustrate the difference in conditions, I will quote from one more of my visits, where the party was not satisfied with his hatches. He had an incubator cellar, stoned up to the roof, with three small windows, about 10 by 20 inches on each side, but those on the lee side were the only ones that were ever opened, and those only a little at the top, and this was all the ventilation there was; there was also a cement floor, which made it very dry. In this room there were some 18 incubators, and, while everything was kept nice and clean, one was very glad to get out and get a good breath of fresh air. The same party had 6 incubators in a very damp cellar, with not much provision for ventilation, but it was very large and roomy, and he had not taken off any hatches from these machines; but the writer told him at once that this was the place to hatch chickens, the other place was too close, too choky and too dry, and it proved just so. So it is very plain that one must learn just what is best to do under his own conditions. This is not to be construed that one is not to get other people's ideas, either verbally or through the papers, — do so by all means; but also learn what their *conditions* are, then take them home and apply them if necessary.

In the artificial rearing of chickens by the amateur there are many obstacles if he undertakes to work them all out himself; but if he so elects, he has many advantages over the beginner of fifteen or twenty years ago, because where he has a chance to imitate, the other had to feel his way in the dark and make many costly experiments; and even now, while there are plenty of parties that are successful in this business, making a good thing out of it, it is very doubtful if there is one single party that is all through experimenting and trying to do better, which simply shows that there is still chance for improvement.

The first requisite in the artificial raising of chickens is the brooder; and when one considers that the most important factor that brought the chicken into this world as a living being was *heat,* and that that heat had to be about right in order to produce a strong, healthy chick, it will be easy to understand that the temperature in the brooder must be about right to have the chicks live and do well, because that important factor does not cease as soon as the chick gets out of the shell but remains in full force for several weeks. No one would think of taking a little chick out of an incubator, where the temperature is above 100°, and turning it loose to shirk for itself with no old hen to cuddle up to, to warm itself; so it was necessary that some way be devised to supply the proper heat. But the next question is, What is the proper temperature, and how shall we provide it? The writer works on the plan that, if there is a suitable place provided that is a little *too* warm, and if the temperature is gradually and continuously decreased to a place that is *too* cool, the chick will instinctively find the place that is just right, providing it is healthy.

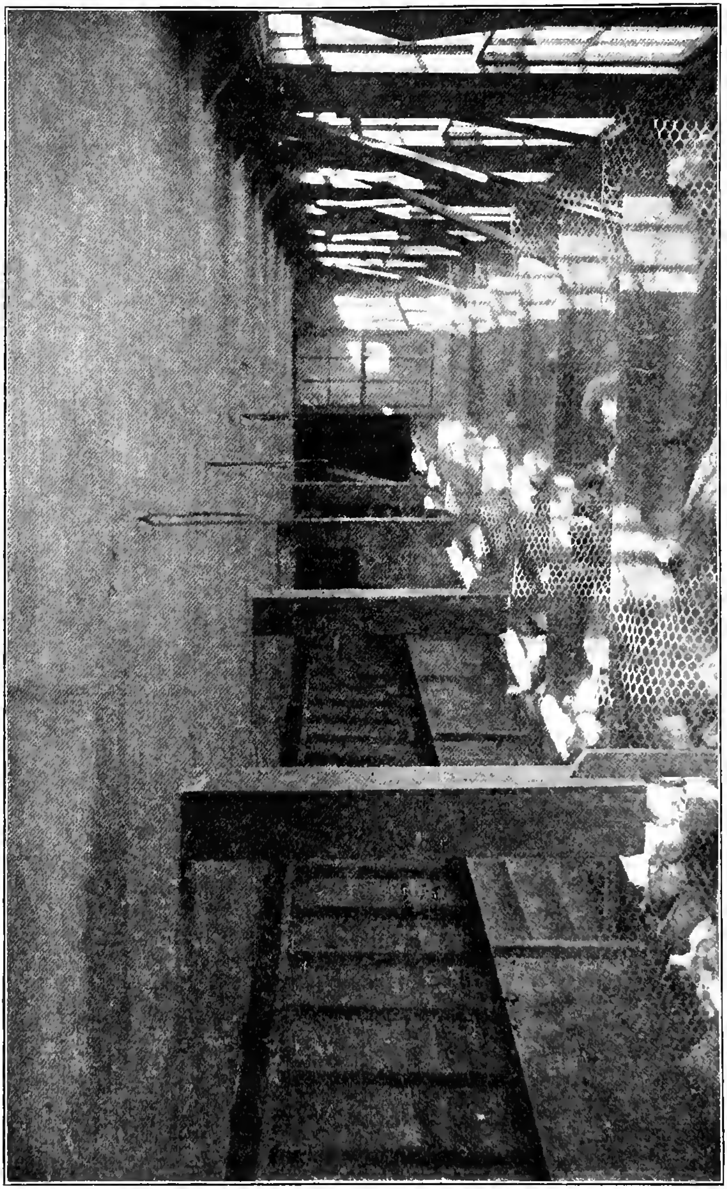

PLATE 1. — Interior of Brooding House.

Plate 1 shows the interior of a 60-foot brooding house. It is 14 feet wide, 6 feet 3 inches high between a cement floor and plastered ceiling, has a walk on the north side 33 inches wide, and is divided into 10 pens, with a window of 9 by 13 glass to each pen on the south side. There is a ventilator 7 inches square over either dividing fence, making 5 in all, which just reaches through the ceiling, then the space above the ceiling has two ventilators 16 inches square out through the roof. The board partition between the walk and the pens is 30 inches high, and just in front of this are the hot-water pipes and in front of these are the return pipes. These pipes run the whole length of the house through the pens, and are 6 inches above the cement floor; they are supplied from a heater that is at one end, down in a pit that is 4½ feet deep and about 7 feet square. An even temperature is maintained by an electric regulator that will open and close the drafts automatically, within 1° of a given point; and if for any reason the temperature gets too hot or too cold, it rings a bell in the attendant's room. For instance, the fire may get low, or a door blow open, or a window drop down, or the attendant may neglect to wind up the machine, etc., but with this arrangement he is notified before any damage is done.

Coarse sand or fine gravel is put all over the floor and up to within 2 to 3 inches of the pipes, and the temperature in this space under the open pipes is kept at 90° F.; but for the first ten days there is a cloth frame 30 inches square laid over one end of the pipes in each pen, for the little chicks to have a place where there is no draft, and the temperature will run up to from 95° to 97° under this cloth, with the temperature at 90° under the open pipes as above. This makes a place that is a little too warm, and as the chicks grow older, so that they do not need so hot a place, they will work out under the open pipes, where it is 90°; and when this is too warm they work out under the returns and from here just out in front of all the pipes, and so on by their own instinct finding the heat that just suits them, and there is no incline or stairs for them to learn to climb, or stay out and get chilled, but the whole width of the pen is heated, and is wide open for them to go where they please. During the first four days there is a board put clear across the pen about

1 foot in front of the pipes, and wide enough to reach from the sand up to 3 to 4 inches higher than the pipes; this prevents an undercurrent of cold air from drawing in under the pipes, right onto the young chicks, which is more than they

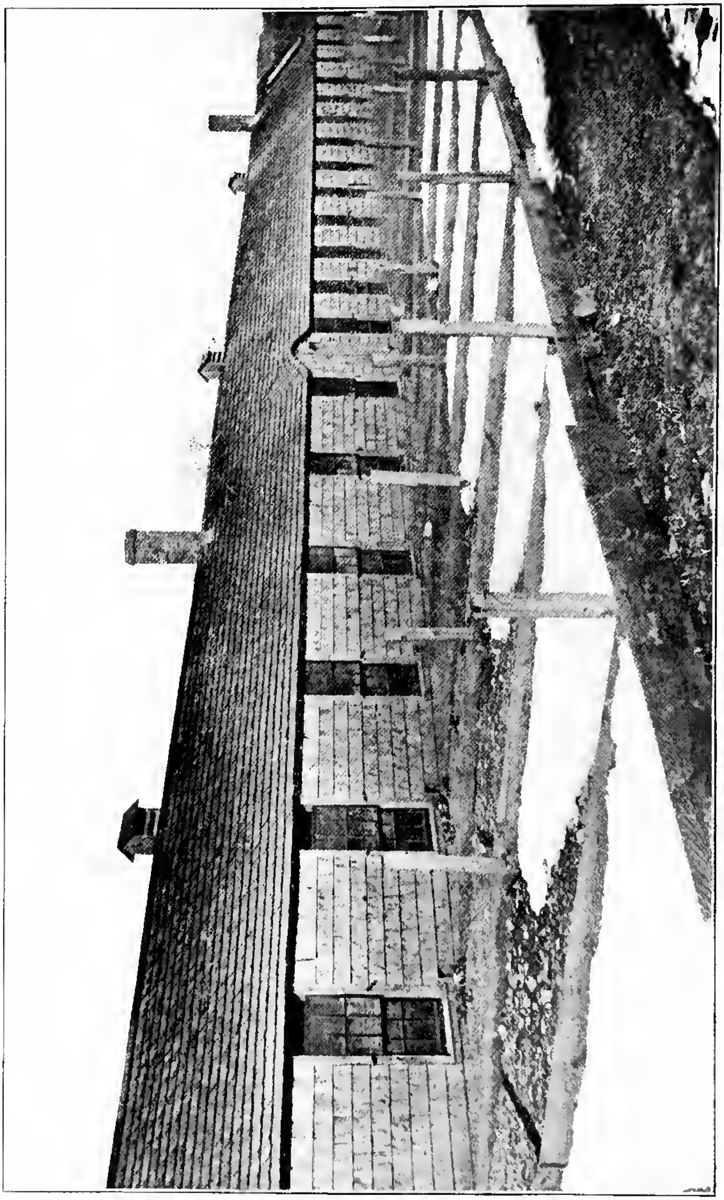

Plate 2. — Outside of Brooder House in Winter.

can stand. As the heat is generated in the pipes, and rises at once, the cold air rushes in to take its place, hence this undercurrent. After the first four days this board is moved away a little every day until about the seventh day, when it is taken away entirely. In one of these pens, 6 by 11½ feet, are put from 100 to 125 chicks right from the incubator, and they are kept there until they are feathered out enough to go out to the colony houses, where there is no heat.

The little chickens are fed sparingly, yet enough, five times per day at first, with any good mixture of fine grains and seeds that has a good variety, such as the Cyphers Chick Feed, scattered all about, and a dry mash composed of two parts of bran and one part of Indian meal, and a few beef scraps. The dry mash and beef scraps are fed on a board 12 by 24 inches, with a lath tacked around the edge. Then of course they must have plenty of good water, and if the sand is right they will get what grit they want out of that, and they must have some sort of green stuff, it does not matter much what, so long as they eat it. Under the above arrangement they have the whole run of the pen after they are a week old, and then the first fair day they are allowed to go out doors a little while each day, and in a few days more, according to the weather, all day.

Plate 2 shows the outside of the brooder house in the winter time, with the windows dropped a little at the top, opposite the pens that have the oldest chicks. Plate 3 shows the colony houses, with snow on the ground also, and they have 6 by 8 foot sills, with a front of 5 feet and the back 3 feet high. There is a self-feeder inside that holds a bag of cracked corn, a box for scraps, another for shells and grit, and a one-half size bucket for water. Fifty chicks are put into each, right from the brooder, and kept there until they are sold as roasters, having a run large enough so that they do not kill the grass.

One of the greatest obstacles in the rearing of chickens artificially is what is known as the "white diarrhœa," and the writer had it here for years, but not for the last three seasons. If the temperature during the whole process is kept where it should be, from the time the eggs are put into the incubator until the chicks are three to four weeks old, there will be no "white diarrhœa." If one will notice how the chicks are taken down, it will be found that they do not eat as much as they should, but drink a great deal of water, which shows that they are feverish, and this is either caused by a lack of sufficient warmth or because they have been chilled.

Then comes the question of what is the proper heat in all of the different stages of the process; and about this time there is another element that enters in, and that is, if a chick comes into the world in a good, strong, vigorous condition, it can stand considerable ill treatment; but if it is not very strong, perhaps has not had just the right heat in the incubator, or the old stock was not just right, and yet it is possible to raise it, *with the right kind of treatment,* it must have a chance to get where it is warmer, if it wants to. The cooling process referred to under the head of incubation can be carried to such an extreme that will produce just this trouble, and then there are several ways by which it can be brought on in the brooder. One way is to run the heat too low all of the time, and in this last case it need not be much too low, either; then it may be run warm enough practically, but the fire goes out, and the longer it remains out and the lower the temperature goes the more likely they are to receive the chill necessary to bring on this trouble; and again, the younger the chick the greater the danger. Then there are brooders that are so constructed that the little chicks do not know enough to find the place where the proper heat may be, after they are once let out; and one will often see them in various numbers, huddled up in some corner trying to keep each other warm, which means white diarrhœa in a few days. In this last instance it may happen that only a few get chilled, and they may be the only ones to have it; then, if the party has used some concoction as a remedy, he may think that the remedy was what cured the rest of the lot, when as a matter of fact they never had it at all. So the best remedy is to give them a chance to go to any temperature they want, and so arranged that the little chicks right out of the incubator cannot help finding it, — in other words "fool proof."

The question is often asked, "Is there a chance for me to get a living in this artificial chicken business?" The reply is, "There certainly is," for the right party; and there are very few if any other kinds of business that offer as large returns for the amount of capital invested. But when the question is asked, "Can *I* make a living at it?" it is

Plate 3. — Colony Houses in Winter.

quite another thing, for no one can tell another whether he can make a success if he goes into any kind of business, — chickens, dairying, sheep raising, manufacturing shoes, stockings or watches, because so much depends on the person himself. If one has but little capital, he must work, and work hard, until he gets everything to do with, then it will go along very easily; but if one has money enough to hire all the hard work done, of course it is just so much easier.

There is one thing that would be of inestimable value and help to the poultrymen of this State, and that is, to have a Massachusetts Poultry Association, one such as every one who is interested in any branch of the business, and even their friends, would be glad to join, that we might work together for the common good of the whole poultry fraternity. For an idea of the many things that might be accomplished, the reader is referred to the Connecticut Poultry Association, which has done and is doing a great deal for this important industry in that State. With a good, strong organization of this kind, we could go before the Legislature and expect to accomplish any reasonable object that we might desire; in fact, we could force the recognition that an industry of such proportions as this rightly deserves.